MINES AND MINERAL RESOURCES OF KERN COUNTY CALIFORNIA

CALIFORNIA
DIVISION OF
MINES AND
GEOLOGY

COUNTY REPORT 1

Wilkerson

MINES AND MINERAL RESOURCES OF KERN COUNTY, CALIFORNIA

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California Division of Mines and Geology

County Report 1

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ABSTRACT

Kern County, the third largest county in California, comprises 8,172 square miles of desert and mountainous terrain in the south-central part of the state. From deposits within its boundaries mineral commodities valued at about $5.4 billion were produced between 1880 and 1957. Ninety percent of this figure is the value of petroleum fuels (petroleum, natural gas, and natural-gas liquids). Most of the remainder is the value of boron, clay, gold, gypsum, limestone for cement, roofing-granule material, silver, and tungsten.

All of the 68 oil fields in the county lie in or adjacent to the San Joaquin Valley. The oil fields are mostly in Tertiary marine sedimentary rocks.

Most of the gold, the metal with the highest recorded total value of output in the county, has been mined, along with silver, from deposits in the Mojave and Rand districts in the southeastern part of the county. Several less productive districts lie in the Sierra Nevada in the east-central part of the county. Gold mineralization is commonly associated with shallow acid intrusive rocks of Tertiary age or with quartz veins in Mesozoic granitic rocks. Nearly all of the deposits are valued mostly for gold rather than silver.

Tungsten, mostly in the form of scheelite, is widespread in pre-Cretaceous metasedimentary rocks preserved as roof pendants in Mesozoic granitic rocks of the Sierra Nevada batholith. Scheelite is also in quartz veins in the Rand district. Placer deposits overlying the scheelite-bearing quartz veins have also been an important source of tungsten in the county.

The world's largest known source of boron lies in Tertiary nonmarine sedimentary rocks in the extreme southeastern part of the county. Although not disclosed, the total value of boron from this deposit is greater than that of many of the other mineral products in the county. In 1959, boron was one of the principal commodities being mined in the county. A $20 million expansion program was completed at the Boron mine and refinery in 1958.

Limestone is used in the manufacture of portland cement at two plants, one newly constructed, and both enlarged in recent years. The limestone is obtained from large pre-Cretaceous deposits in the southern Sierra Nevada and Tehachapi Mountains.

Clay has been mined from Tertiary nonmarine sedimentary rocks, altered Tertiary intrusive rocks, and Quaternary playa lake sediments. Total value of clay produced in Kern County is more than $9 million.

In recent years, gypsum from deposits lying mostly in western Kern County, sand and gravel obtained from coarse Quaternary sediments, and roofing-granule material obtained from Tertiary volcanic rocks in the Tehachapi Mountains and the Sierra Nevada have increased annually in total value and amount of output.

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By BENNIE W. TROXEL and PAUL K. MORTON

With sections on clay and diatomaceous earth, by George B. Cleveland;* roofing granule materials and the Cove district, by Thomas E. Gay, Jr.;* sand and gravel, by Harold B. Goldman;* limestone, dolomite, and cement, by Cliffton H. Gray, Jr.;* petroleum fuels, by Earl W. Hart;* and borates, gypsum, magnesite, quartz and feldspar, salt, and the Kramer borate district, by William E. Ver Planck.*

INTRODUCTION

The abundant mineral resources of Kern County have contributed much to the history and development of California. In 1957, the county ranked first in value of mineral production in California with a total of $369,-000,000. The yearly value of petroleum fuels alone, about 85 percent of the value of all mineral products, ordinarily exceeds the value of agricultural products from the county. The total recorded value of all mineral output in Kern County from 1880 through 1957 is about $5½ billion, more than half of which has been produced since 1946, and about $5 billion of which was from petroleum fuels. Boron, cement, clay, gold, gypsum, pumice, salt, sand and gravel, silver, and tungsten are the other important mineral products of the county exclusive of petroleum fuels. Among these, gold, valued at $46.4 million, ranks first in total value of the metallic mineral products; silver, valued at $6 million, ranks second; and tungsten, valued at $1.5 million, ranks third. Clay, limestone products, boron, and sand and gravel are the most highly valued of the nonmetallic minerals. Boron ranks high in dollar value of both total and current annual output. In recent years the county has yielded a significant proportion of California's output of roofing granules and uranium.

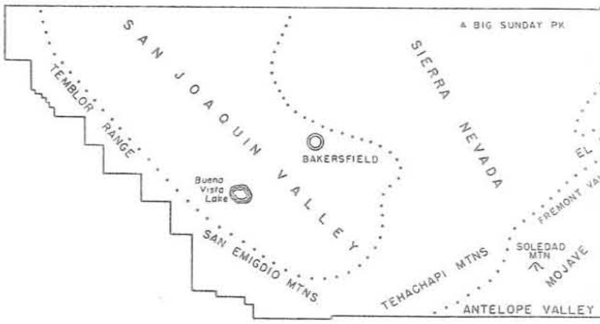
Geographic and Cultural Features

Kern County comprises an area of 8,172 square miles in south-central California. It is 130 miles long from east to west and 66 miles wide from north to south. It is divisible into three major geographic units (fig. 1)—the south end of the San Joaquin Valley, the southern Sierra Nevada, and the northwestern part of the Mojave Desert.

The Temblor Range, a part of the California Coast Ranges, bounds the San Joaquin Valley on the west. The crest of the range roughly coincides with the western boundary of the county. The San Emigdio Mountains, at the southern terminus of the San Joaquin Valley, lie barely north of the western one-third of the south boundary. Eastward, the south boundary extends through the Tehachapi Mountains and into the Mojave Desert. The north boundary extends across the Sierra Nevada and the San Joaquin Valley.

Bordering the Mojave Desert on the northwest is a northeast-trending mountainous belt comprising the Tehachapi Mountains, the southeast flank of the Sierra Nevada, and El Paso Mountains. The principal prominences in the Mojave Desert are the Rand Mountains, parallel to and about 5 miles southeast of El Paso Mountains, and

Figure 1. Principal geographic features in Kern County.



* Mining geologist, California Division of Mines and Geology.

Table 1. Mineral production in
(Data compiled from reports published by the
California Division of Mines

	Antimony		Copper		Gold	Lead		Silver	Tungsten		Brick		Clay		Gypsum		Lime		Stone[1]	
Year	Tons	Value	Pounds	Value	Value	Pounds	Value	Value	Units	Value	M	Value	Tons	Value	Tons	Value	Barrels	Value		Value
1880					$94,214			$390												
1881					190,000			14,000												
1882					260,000			20,000												
1883					150,000			5,000												
1884					100,000			5,000												
1885					72,003															
1886					94,640			1,721												
1887					72,358			150												
1888					60,000			2,500												
1889					242,676			7,517												
1890					117,341			586												
1891					107,735			61												
1892					107,738			73												
1893					83,665			1,754												
1894	92	$3,720			310,707			39,700									33,000	$26,500		
1895	33	1,485			231,433			46,064									25,400	24,980		
1896	15	2,250			590,867			34,650									37,100	32,329		
1897	25	3,500			754,313			10,471			1,100	$6,600					53,400	70,370		
1898	40	1,200			1,017,930			6,543			2,000	14,000					42,000	29,900		
1899					863,414			6,810			1,600	11,400	620	$12,400			64,700	57,690		
1900			4,000	$750	805,252			147,736			2,525	17,300	500	3,750			57,721	51,700		
1901	50	8,350	429,248	67,606	1,007,059	1,600	$64	40,497			4,600	23,400	1,000	19,500			62,000	82,700		
1902			235,840	27,122	1,165,982			99,135			3,500	24,500	987	19,246	1,000	$8,000	99,360	80,856		
1903			4,300	559	1,022,353			114,614			9,000	30,000	250	4,750	1,000	8,000	101,661	76,246		
1904					1,426,523			151,189			700	4,900	500	9,500			178,038	172,000		
1905					1,160,971			134,944	5,200	$18,800	750	6,000	53	54	1,350	11,000	279,650	255,500		
1906					806,117			129,503		183,600	4,275	34,200	215	752			295,613	267,096		
1907					878,798			86,033			2,168	18,428			1,000	5,500	175,000	169,822		
1908					827,087			96,550			2,080	19,552			500	2,000	116,717	87,788		
1909					654,799	4,781	174	101,633			3,365	29,634	359	5,385	1,700	8,300	115,709	88,869		
1910					619,974			35,041			8,332	63,711	242	121	1,675	8,305	99,187	86,198		$112,000
1911			29,441	3,680	557,471	2,417	109	5,833			5,603	41,426			853	4,245	96,500	82,025		107,880
1912					830,421	19,664	885	11,480			1,890	23,120			8,479	18,188	162,831	124,894		
1913			3,498	542	649,712	1,376	61	11,851			1,625	22,000	208	104	10,000	22,750	135,000	91,200		
1914	267	11,301	7,394	983	594,337	379	15	8,002			3,834	29,214	346	172	82	320	81,600	65,100		
1915	145	5,880	1,047	183	983,319	84,371	3,965	13,316		U				U		U	55,176	39,523		59,319
1916	113	16,041	24,754	6,089	747,012	24,274	1,675	8,475	19,300	482,387	3,177	23,824		U				U		63,723
1917			251,225	68,584	537,852	9,684	833	7,813	4,900	58,148	and tile	22,785		U				U		31,787
1918			95,580	23,608	246,127		U	7,817		U	1,678	16,380					23,615	23,615		311
1919					150,589			8,402			1,709	175,112		U			86,952	112,724		28,320
1920			206	38	61,187			8,385		U	3,850	56,550					76,395	106,733		31,180
1921					84,698			1,897			5,810	85,820				U	72,629	141,491		38,208
1922				U	124,337		U	6,524			5,082	66,652						U		35,582
1923					107,051			33,151			5,271	68,375		U		U	17,985	214,183		9,225
1924				U	154,132		U	35,902			and clay	23,058		see brick			8,130	96,880		5,244
1925		U			135,545			7,455				U		U						3,000
1926					135,508			4,667			4,591	55,140		U		U		U		28,000
1927				U	171,100			8,932			4,835	50,438		U		U		U		79,510
1928		U			186,453			5,245			2,126	30,791		U		U		U		78,663
1929					148,421			2,312		U	3,503	44,681	58,551	[3]85,845						361,896
1930				U	165,435		U	1,757				U	371,123	[3]117,834		U				450,351
1931			207	19	202,108	6,307	233	2,534				U	27,499	[3]46,668		U				108,958
1932				U	296,250		U	3,957				U	14,770	[3]22,871						49,077
1933			760	49	424,376		U	70,931				U		U						70,931
1934			5,502	440	1,021,849	11,008	407	73,468		U		U	19,526	[3]30,142						131,743
1935			37,971	3,152	1,391,646	2,180	87	105,978		U		U		U						124,360
1936			1,402	129	2,401,280		U	295,591				U		U		U				184,696
1937			5,504	666	2,465,085	2,923	172	561,712		U		U	42,628	130,482						237,757
1938				U	3,034,605	6,994	322	742,256				U	38,910	64,821						240,750
1939		U		U	3,151,015	28,542	1,341	767,633		U		U	23,213	[3]32,373		U				158,220
1940	216	6,062	2,617	296	2,887,255	27,133	1,357	591,608				U		U	70,043	93,964				282,576
1941		U	5,146	609	2,800,980	31,589	1,801	617,381	4,414	114,754		U	69,671	[3]242,547	112,088	203,506				347,459
1942		U	2,172	263	1,991,990	17,615	1,180	425,019	2,591	61,682			71,172	[3]118,694	156,104	206,659				449,160

Kern County, California, 1880-1957.
California Division of Mines, compiled by the
and U.S. Bureau of Mines.) ·

Asphaltum		Natural gas		Petroleum		Miscellaneous			Unapportioned[2]		
Tons	Value	M. cu. ft.	Value	Barrels	Value	Amount	Value	Substance	Value	Substance	Year
											1880
											1881
											1882
											1883
											1884
											1885
											1886
											1887
											1888
											1889
											1890
											1891
											1892
											1893
6,900	$138,000	...	...	11,215	$69,334						1894
1,400	28,000	...	...	116	116		$10,000	Limestone			1895
2,804	44,680	...	...	235	235	5,000T*	5,000	Limestone			1896
4,650	86,350	...	...	...	...	27T	3,382	Borates			1897
						220T	1,100	Coal			
1,850	50,000	...	...	10,000	10,000						1898
2,537	57,670	...	...	15,000	13,500						1899
701	14,020	...	...	919,275	827,348						1900
3,112	43,126	...	...	3,902,125	1,131,616						1901
10,150	101,500	...	...	9,777,948	1,955,585						1902
8,006	100,787	...	...	18,001,148	3,600,230	28T	83	Bituminous Rock			1903
12,451	124,110	...	...	19,608,045	3,431,408						1904
10,586	105,860	...	...	17,069,715	3,174,966						1905
23,136	231,360	...	...	13,826,000	3,765,200	...	44,000	Limestone			1906
20,443	260,158	...	...	15,700,308	4,673,867						1907
50,000	475,000	...	...	18,777,871	9,388,935						1908
54,599	655,391	38,000	$2,714	24,549,758	12,565,246	...	500	Gems	$859,927	Years 1900-1909.	1909
76,605	811,846	975,724	47,364	40,641,159	17,825,212	...	4,331	Limestone			1910
289,610	$3,327,858	1,658,380	165,438	46,562,825	20,207,906	600T	400	Limestone			1911
...	...	4,400,000	325,484	51,448,067	21,762,532						1912
...	...	7,111,237	568,899	58,698,432	27,038,474	...	...	...	600	Other minerals	1913
...	...	6,508,868	390,532	65,332,633	26,721,046	...	...	...	180,575	Other minerals	1914
...	...	12,163,461	737,638	54,810,669	23,184,913	1,425T	1,710	Limestone	299,997	Cement, magnesite, salt, and "U"	1915
						20,000T	50,000	Salt			
...	...	16,679,658	1,379,033	54,120,509	34,691,246	...	30,047	Lime and limestone	363,516	Cement, feldspar, magnesite, mercury, salt and "U".	1916
						4,100T	23,700	Silica			
...	...	25,819,376	1,445,880	53,065,066	47,387,104	300F	27,250	Mercury	139,345	Feldspar, magnesite, salt and "U".	1917
...	...	23,545,128	1,507,912	49,049,917	61,410,496	...	...	...	174,419	Limestone, magnesite, manganese, mercury, salt, and "U".	1918
...	...	25,363,739	1,618,913	47,734,035	64,440,947	17,000T	81,000	Salt	9,345	Limestone, mercury, and "U".	1919
...	...	34,912,865	1,810,147	50,660,438	86,831,991	22,000T	87,000	Salt	108,270	Cement, gems, mercury, and "U".	1920
						3,060T	20,100	Silica			
...	...	40,136,930	1,926,797	57,434,945	97,639,407	18,500T	93,500	Salt	829,115	Cement, limestone, silica, and "U".	1921
...	...	47,644,633	2,282,100	53,512,157	64,803,222	18,000T	66,000	Salt	1,166,582	Cement, silica, and "U".	1922
...	...	42,421,592	2,051,656	45,952,794	37,629,300	18,921T	97,336	Salt	1,602,138	Cement, limestone, pumice, sulfur, and "U".	1923
...	...	47,881,308	2,522,551	61,175,405	69,572,934	10,506T	44,115	Salt	1,709,635	Arsenic, cement, pumice, sulfur, and "U".	1924
...	...	45,649,845	2,290,608	58,852,742	84,255,094	6,890T	28,858	Salt	2,680,166	Borates, cement, and "U".	1925
...	...	44,182,140	2,158,867	54,549,646	78,987,887	11,279T	41,116	Salt	2,144,889	Cement, feldspar, pumice, silica, and "U".	1926
...	...	39,401,478	2,057,807	51,570,412	58,738,699	14,960T	69,839	Salt	3,533,163	Borates, cement, feldspar, onyx, pumice, and "U".	1927
...	...	35,107,062	1,916,797	44,096,638	36,803,054	...	...	...	4,043,778	Borates, cement, feldspar, pumice, salt, and "U".	1928
...	...	34,409,095	1,861,950	43,577,420	32,299,584	...	...	...	4,004,550	Borates, cement, mercury, salt, volcanic ash, and "U".	1929
...	...	27,908,423	1,290,090	44,170,810	37,015,139	111,301T	2,335,190	Borates	1,612,181	Cement, feldspar, mercury, rose quartz, salt, volcanic ash, and "U".	1930
...	...	26,977,942	1,444,732	35,794,138	22,765,072	...	...	...	4,212,034	Borates, cement, feldspar, mercury, mineral water, salt, volcanic ash, and "U".	1931
...	...	26,234,262	1,201,293	35,552,561	23,393,585	...	...	...	3,102,892	Borates, cement, salt, volcanic ash, and "U".	1932
...	...	20,571,398	916,090	35,349,272	23,521,406	...	...	...	2,931,110	Borates, cement, gems, mercury, salt, volcanic ash, wollastonite, and "U".	1933
...	...	21,309,723	1,017,661	41,823,494	30,475,225	...	...	...	4,302,252	Borates, cement, gems, mercury, salt, volcanic ash, wollastonite, and "U".	1934
...	...	36,089,134	1,891,675	54,723,481	39,905,553	...	...	...	3,521,958	Borates, cement, salt, volcanic ash, and "U".	1935
...	...	58,044,172	3,246,196	62,273,932	53,781,287	...	...	...	5,435,585	Borates, cement, mercury, mica schist, salt, volcanic ash, and "U".	1936
...	...	65,142,854	3,950,521	69,878,714	61,905,918	...	...	...	4,909,821	Borates, cement, mercury, salt, volcanic ash, and "U".	1937
...	...	68,974,794	4,244,897	66,093,496	58,803,255	...	...	...	4,397,668	Borates, calcium silicate, cement, mercury, salt, volcanic ash, and "U".	1938
...	...	73,950,832	5,191,065	58,893,865	48,664,001	...	...	...	4,140,039	Borates, calcium silicate, cement, mercury, salt, volcanic ash, and "U".	1939
...	...	79,409,481	4,257,590	60,660,165	50,835,439	...	...	...	3,899,585	Borates, calcium silicate, cement, mercury, salt, volcanic ash, and "U".	1940
...	...	91,807,125	4,573,754	65,628,935	57,607,724	...	...	...	4,344,033	Borates, calcium silicate, cement, quartz, salt, volcanic ash, and "U".	1941
...	...	70,890,547	3,431,558	72,093,741	64,477,255	...	...	...	4,365,607	Borates, cement, quartz, salt, volcanic ash, and "U".	1942

Table 1. Mineral production in
(Data compiled from reports published by the
California Division of Mines

Year	Antimony		Copper		Gold	Lead		Silver	Tungsten		Brick		Clay		Gypsum		Lime		Stone[1]	
	Tons	Value	Pounds	Value	Value	Pounds	Value	Value	Units	Value	M	Value	Tons	Value	Tons	Value	Barrels	Value		Value
1943			2,726	$354	$103,705		U	$7,281	2,112	$57,697		U	96,619	[3]$261,243	250,989	$338,049				$190,066
1944		U		U	45,185	7,142	$571	754	306	7,390		U	152,237	[3]522,711	292,306	394,356				222,607
1945				U	31,990		U	386		U			168,925	711,676		U				156,50
1946					94,710			6,972		U		U	177,960	[3]544,841	268,162	352,484				327,259
																			Total	$4,806,325
																			Sand and gravel	
																			Tons	Value
1947					217,980			6,956		U			21[illegible],175	[4]746,372	352,977	[5]558,269			608,694	$671,917
1948					216,160			12,226		U			215,953	[4]768,280	271,908	414,213			581,459	663,945
1949					199,190			15,888		U			202,509	[4]699,635	202,904	314,574			495,209	588,741
1950					216,895			8,625		U			93,026	[4]524,084	203,080	320,491			654,933	835,657
1951			300	73	316,470	2,500	432	30,116		U			96,280	[3,4]700,620	287,813	454,750			839,239	944,882
1952		U	800	194	342,650	200	32	41,083		U			122,406	[4]831,901	552,739	848,272			860,789	722,589
1953					105,315	4,200	550	3,492	607	37,968			68,324	[4]599,704	249,502	433,018			555,714	628,928
1954					199,325			12,730	3,100	113,012			46,266	[4]433,994	245,486	424,245			659,508	797,214
1955			200	75	160,090			26,484	7,683	292,292			46,315	[4]456,115	301,517	552,318			923,785	1,205,055
1956			300	127	158,655	500	79	13,786	1,888	114,342			49,576	[4]208,016	426,608	769,264			1,106,645	1,807,330
1957			100	32	U			U		U			44,300	[4]268,437	472,953	814,805			859,669	1,282,914
Totals Value		[6] $59,789		[7] $206,222	[6] $46,428,508		[7] $16,345	[6] $5,983,924		[7] $1,542,042		[8] $1,138,991		[9] $9,245,610		[7] $7,590,045		[7] $2,758,912		[10] $10,149,172
Amt.	996		1,152,240			297,379			52,101		106,909		2,536,534		4,744,818		2,603,069		8,145,624	

* T = tons, F = flasks (76 lbs.), lb. = pounds.
U Value included in unapportioned.
[1] Includes crushed rock, rip-rap, roofing granules, rubble, and sand and gravel.
[2] Includes value of items marked "U" in other columns.
[3] Exclusive of value of bentonite included in unapportioned.
[4] Includes value of brick clay.
[5] Includes small quantity from Kings County.

Soledad Mountain, near Mojave. The principal valleys in the Mojave Desert are Antelope Valley, at the western end of the desert area, and Fremont Valley which lies farther east. Indian Wells Valley lies east of the Sierra Nevada in the northeast corner of Kern County.

Elevations in the county range widely, from 270 feet above sea level at Buena Vista Lake in the southwestern part of the San Joaquin Valley, to more than 8,400 feet atop Owens Peak in the Sierra Nevada. The San Joaquin Valley lies mostly below the 1,000-foot elevation, and the Mojave Desert areas lie mostly between the 2,000- and 3,000-foot elevations. Both the Mojave Desert and San Joaquin Valley have arid climates with an average annual rainfall of only a few inches. They are, however, important agricultural centers: their gross aggregate yield was $232,300,000 in 1957 (Kern County Agricultural Commission). The semi-arid areas of the Sierra Nevada, Tehachapi, and San Emigdio Mountains receive more rain than the valleys and are used principally for livestock grazing. Population in Kern County has increased from about 6,000 in 1880 to an estimated 285,000 in 1958 (Kern County Board of Trade, 1958). Nearly two-thirds of the residents live in the San Joaquin Valley and about half of these live in the Bakersfield area. Mojave, Tehachapi, and Ridgecrest are the largest settlements outside of the San Joaquin Valley.

Motor transportation in Kern County is well provided for by five Federal highways, six State highways, and a network of paved county roads. Most of the remote mountainous areas are accessible by graded roads. The Southern Pacific Company and the Atchison, Topeka, and Santa Fe Railway Company lines serve many points in the San Joaquin Valley and the Mojave Desert (pl. 1). Both lines cross the Mojave Desert, the Tehachapi Mountains, and the San Joaquin Valley. Branch lines extend to several points in the San Joaquin Valley and one branch line extends from Mojave, around El Paso Mountains, into Indian Wells Valley.

History

The first permanent settlers in Kern County arrived in the 1840s after several expeditions had passed through the county. The county was organized April 2, 1866, and Havilah, a mining settlement 27 miles northeast of Bakersfield, became the county seat. The county was formed from parts of Los Angeles and Tulare Counties, and the boundaries were modified from time to time until about 1895. Bakersfield has been the county seat since 1874.

Kern County, California, 1880-1957.—Continued
California Division of Mines, compiled by the
and U.S. Bureau of Mines.)

Asphaltum		Natural gas		Petroleum		Miscellaneous			Unapportioned[2]		
Tons	Value	M. cu. ft.	Value	Barrels	Value	Amount	Value	Substance	Value	Substance	Year
....	....	65,576,727	$3,395,175	84,934,943	$86,174,973	14,214lbs.	$1,535	Zinc	$3,715,283	Borates, cement, salt, volcanic ash, and "U".	1943
....	....	72,111,360	3,786,075	92,694,311	98,829,308	8,532lbs.	973	Zinc	4,447,413	Borates, cement, salt, tin, volcanic ash, and "U".	1944
....	....	76,648,176	3,972,990	110,290,276	116,846,281	11,897lbs.	1,368	Zinc	4,994,872	Borates, cement, salt, tin, volcanic ash, and "U".	1945
....	....	72,945,848	5,694,426	100,640,406	120,353,402	....	....	....	5,708,558	Borates, cement, pumice, salt, volcanic ash, and "U".	1946
											1880
											1881
											1882
											1883
Natural gas liquids											
Barrels	Value										
5,636,905	$10,337,000	86,280,000	8,329,000	106,058,000	176,761,000	....	....	....	11,218,422	Borates, cement, pumice, quartz, salt, stone, and "U".	1947
6,001,714	17,323,000	84,803,000	8,414,000	105,421,000	253,416,000	....	....	....	11,002,278	Borates, cement, feldspar, pumice, pumicite, quartz, salt, and "U".	1948
7,887,571	24,664,000	75,965,000	8,719,000	92,045,000	204,849,000	....	....	....	11,698,645	Borates, cement, stone, and "U".	1949
9,714,075	28,121,000	73,683,000	8,715,000	84,017,000	159,126,000	....	....	....	15,012,715	Borates, cement, pumice, quartz, and "U .	1950
9,276,134	25,366,000	76,540,276	10,120,538	89,651,073	191,572,128	102,874T 7,800lbs.	104,566 1,420	Stone Zinc	19,837,439	Borates, cement, pumice, quartz, and "U '.	1951
8,798,000	23,724,000	71,505,994	10,445,036	89,962,498	190,506,712	....	....	....	15,047,534	Borates, cement, pumicite, salt, and "U".	1952
8,509,000	29,474,000	94,344,606	18,222,198	93,580,090	217,068,760	....	....	....	17,460,932	Borates, cement, limestone, pumice, quartz, salt.	1953
8,101,000	27,874,000	97,399,119	20,064,000	91,087,878	224,019,662	106,535T	259,873	Crushed stone	28,335,539	Borates, cement, feldspar, limestone, manganese, pumice, salt.	1954
7,453,000	30,580,000	104,638,000	21,285,357	94,455,000	233,512,222	....	....	....	25,942,332	Borates, cement, gems, pumice, salt, sodium carbonate, sodium sulfate.	1955
9,058,761	29,207,000	78,148,000	16,880,000	96,485,000	244,493,000	266,972T 900lbs.	457,238 123	Miscellaneous stone Zinc	43,102,104	Borates, cement, gems, pumicite, salt, sodium sulfate, uranium.	1956
6,701,523	23,211,000	86,022,000	18,854,000	91,508,000	273,746,000	234,079T	487,441	Stone	50,315,054	Borates, cement, gems, gold, limestone, pumice, pumicite, salt, silver, sodium carbonate, uranium, and "U".	1957
	$269,881,000		$232,313,004		$4,401,173,941		$4,480,074		$342,883,895	GRAND TOTAL VALUE... $5,343,985,627	
87,137,683		2,419,928,316		3,310,781,747							

[6] Exclusive of value included in unapportioned and production before 1880.
[7] Exclusive of value included in unapportioned.
[8] Exclusive of value included in unapportioned and with clay.
[9] Exclusive of value included in unapportioned and with brick; includes value of some brick clay.
[10] Exclusive of value included in stone before 1947.

The earliest mining in Kern County was in 1852 at placer gold deposits in Greenhorn Gulch, which drains into the Kern River about midway between Democrat Springs and Miracle Hot Springs (see pl. 1). In 1856, the antimony deposits near Antimony Peak, a few miles northwest of Frazier Park, were described by W. P. Blake (1857, p. 291). Gold discoveries were made subsequently at many other sites in the Sierra Nevada and the Mojave Desert.

Mining of most of the other mineral commodities in Kern County began in the 1890s and early 1900s. Mineral commodities which have yielded most of the dollar output in Kern County and their approximate year of earliest recorded production or discovery are boron (1913), clay (1899), gypsum (1902), limestone for lime (1894), limestone for portland cement (1909), petroleum fuels (1894), salt (1914), and tungsten (1905) (see table 1). Sand and gravel deposits have been most productive since about 1940; and uranium has been produced since 1954.

Land and Land Use

Of the 5,228,000 acres of land in Kern County, 1,424,699 acres (27 percent) is Federal land (Kern County Board of Trade, 1958); but this figure includes Federal land not open to mineral location. The Federal land open to mineral location (public domain) roughly coincides with the boundaries of the Sequoia and Los Padres National Forests and also includes much of the desert land in the east central part of the county (northwest of Mojave) and small areas elsewhere in the county.

Persons desiring to prospect or locate mineral claims in Kern County are faced with the ever-increasing problems of knowing the status of the land, and of a gradually decreasing amount of land open to mineral location. Information regarding status of land and other information relative to mining in Kern County are available from the several Federal, State, and County agencies that are listed in table 2.

Topographic maps compiled by the U. S. Geological Survey at scales of 1:62,500 and 1:24,000 are available for most parts of Kern County. In general, topographic maps at a scale of 1:24,000 have been made for the western one-third of the county, and maps at a scale of 1:62,500 have been made for the eastern two-thirds. The names and boundaries of topographic maps published by the U. S. Geological Survey are shown on figure 2.

Table 2. Sources of information relative to mining in Kern County.

Agency	Address	Type of information or services available or for reference use
California, State of:		
Industrial Safety, Division of	Brower Bldg., Bakersfield	Mine safety orders, mine inspection.
Labor Commission	Brower Bldg., Bakersfield	Laws pertaining to employment.
Land Commission	217 W. First St., Rm. 302, Los Angeles 12	Mineral leasing and prospecting of state land.
Mines and Geology, Division of	Los Angeles State Office Bldg., Rm. 1065, 107 South Broadway, Los Angeles 12	Geology, mineral resources, mines, ore buyers licensing, periodic inspection of license holders, mineral production statistics, state mining laws.
Oil and Gas, Division of, District No. 4	1613 16th St., Bakersfield	Regulations pertaining to conservation of oil and gas, descriptions of oil fields, yearly summary of operations in California oil fields.
Water Resources, Department of	Los Angeles 15	Reports on water resources, water rights, water table and well data, dam supervision, state water projects, etc.
Kern County:		
Board of Trade (Chamber of Commerce)	P.O. Box 1312, Bakersfield	General information concerning business, industry, recreation.
Recorder	Hall of Records, Bakersfield	Chronological and alphabetical cross references of mining claims and owners, copies of recorded location notices, transfers of title, proof of annual labor, etc.
Tax Assessor	Court House, Bakersfield	Maps showing land-ownership data, record books (reference use only).
United States:		
Agriculture, Dept. of, Commodity Stabilization Service, Performance and Aerial Photo Division, Western Laboratory	2505 Parleys Way, Salt Lake City 9, Utah	Aerial photos of most of Kern County.
Agriculture, Dept. of, Forest Service, District office	Haberfelde Bldg., 1706 Chester Ave., Bakersfield	Mining claims in national forests, regulation of surface rights.
Army Corps of Engineers	751 S. Figueroa St., Los Angeles	Boundaries of military reservations and certain other federal lands.
Commerce, Dept. of, Atomic Energy Commission	222 South West Temple, Salt Lake City, Utah	Regulations, purchase contracts and geologic information regarding uranium deposits.
Geological Survey, Oil and Gas leasing Division	2510 M Street, Bakersfield	Oil leasing information.
Geological Survey, Public Inquiries Office	217 W. Seventh St., Los Angeles	Topographic maps and publications sales.
Geological Survey, Pacific Region Engineers	345 Middlefield Rd., Menlo Park	Sales copies of aerial photos of parts of northeastern Kern County and advance topographic maps.
Land Management, Bureau of	Sacramento (land located from Mount Diablo meridian) Riverside (land located from San Bernardino meridian)	Claim and patent information, homesteads, federal mining laws, land withdrawal.

Water Resources

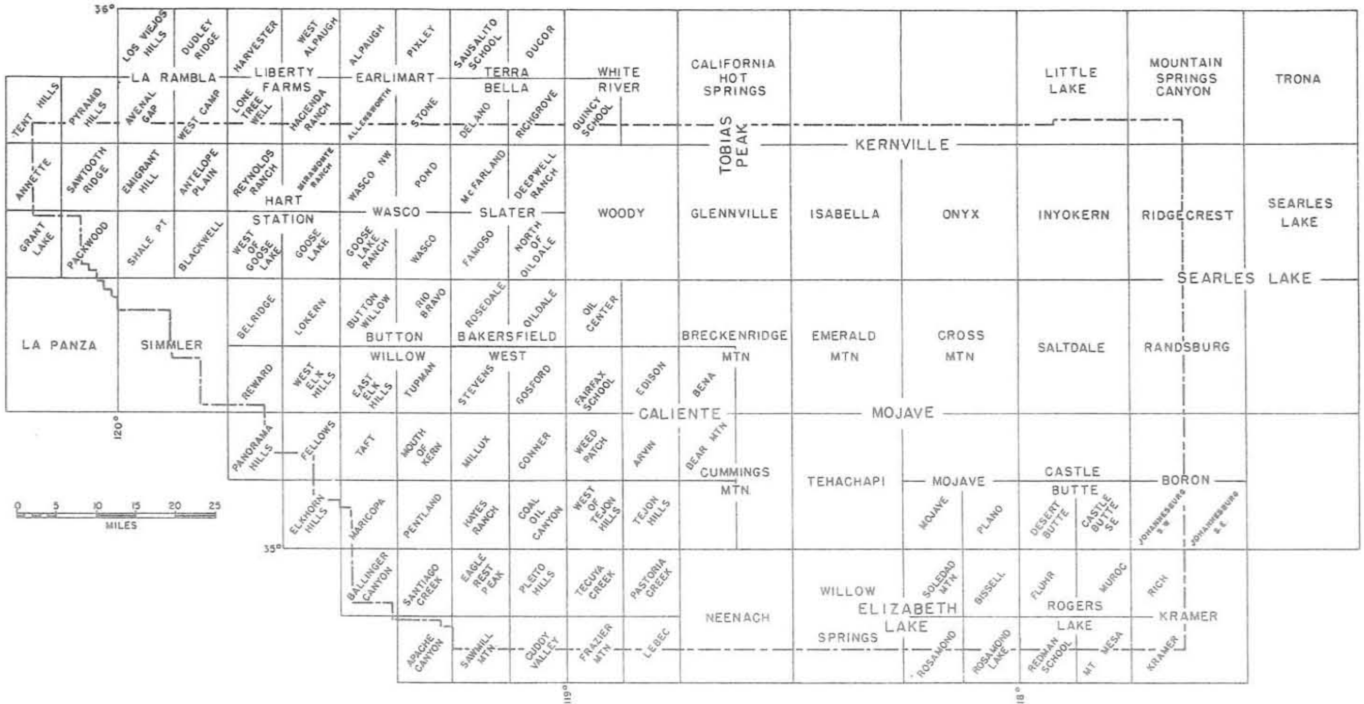
Mining and milling activities normally require substantial amounts of water of good quality. In Kern County during 1958, the three largest consumers of water for treatment of mineral products were Monolith Portland Cement Co., near Tehachapi; the Creal Cement plant of California Portland Cement Co. near Mojave; and the United States Borax and Chemical Corporation plant at Boron, in southeastern Kern County. With the relatively few current mining operations in the county, however, the mining industry does not consume a large proportion of the available water. The mines in the Sierra Nevada, though mostly idle in 1958, can and have been supplied with adequate water from local streams to meet drilling and milling requirements. In general, however, pumping and storage facilities are necessary to conserve and re-use water wherever feasible. Some mines and mills, especially in the desert areas of the county, need more water than is available and must import it from sources several miles away. The Rand district in southeastern Kern County is particularly water-deficient. Water for mine operations has been obtained from the Butte mine at Randsburg; from wells near Cuddeback Dry Lake, 10 miles to the southeast of Randsburg; and from wells near Goler Canyon 6 miles northwest of Randsburg. Mine operators in the Mojave district, in general, have obtained water from nearby sources.

Precautions to avoid stream pollution do not constitute major problems in most areas, but special care must be exercised in areas adjacent to the Kern River.

Kern County embraces parts of two major drainage systems of California. The western two-thirds of the county drains into the San Joaquin Valley and the remainder drains into the Mojave Desert. Most of the water consumed in the southern San Joaquin Valley is supplied from subsurface sources and gravity diversions from the Kern and other rivers. Surface waters emerging from the mountain areas flow toward Buena Vista Lake, but much of the water is absorbed in porous valley fill and eventually seeps downward to recharge groundwater basins.

The Kern River is the largest single source of surface water in the county. Its average annual runoff is 760,000

Figure 2. Index to topographic maps, Kern County.



acre-feet of water (an acre-foot is 325,851 gallons of water) and drains about 2,420 square miles in the Sierra Nevada. The flow of the lower part of Kern River is controlled at Isabella Dam, 34 miles northeast of Bakersfield. Isabella Lake, the largest reservoir in the county, has a storage capacity of 550,000 acre-feet of water. Buena Vista Lake has a capacity of 205,000 acre-feet of water, but is used at present only during periods of exceptionally high runoff.

The estimated mean annual runoff into Antelope Valley at the west end of the Mojave Desert is 66,000 acre-feet (California Dept. Water Res., Bull. 1, 1951, table 72). One-third of this comes from streams on the north and west side of the valley (California. Div. of Water Res., Rept. to Assembly, 1947, table 1); the rest flows from streams in Los Angeles County. Almost all the water needs in Antelope Valley are supplied by pumping from wells, and overdraft is a serious problem. The quality of water is good in most areas and the water table lies at depths below 50 feet. Two groundwater basins exist in Antelope Valley; the Antelope Valley basin in the west and El Mirage basin to the east.

The principal sources of surface water in Tehachapi Valley are Tehachapi Creek, White Rock Creek, and numerous smaller creeks draining the north slopes of Cummings and Double Mountains. The lowest part of Tehachapi Valley is occupied by Proctor Lake, which is at the east end of the valley. During periods of exceptionally high runoff Proctor Lake overflows into Tehachapi Pass and subsequently flows southeastward into Fremont Valley in the Mojave Desert.

The source of water in Indian Wells Valley, in the northeast corner of the county, is groundwater basins recharged by runoff from the Sierra Nevada; but the water generally is of poor quality and at deep levels.

Acknowledgments

This report is the product of work by many members of the Division of Mines. Information was gathered from both published and unpublished sources, in the field, and from many mine owners or persons living in the vicinity of the mines. The writers are grateful to all those who contributed information for the report.

The first work done for the Kern County report was by Rudolph W. Fekete for a few months in 1954. He investigated the mineral deposits in the Breckenridge Mountain quadrangle. Later in 1954, Thomas E. Gay, Jr. and Bennie W. Troxel were assigned the project. Mr. Gay compiled most of the bibliographic material for each mine or prospect; made field investigations of properties near Kernville, Claraville, and Erskine Creek; and made field investigations of roofing-granule plants and deposits. In 1956, he was assigned to the Redding office of the Division of Mines and was relieved of further work for the report. J. Grant Goodwin was assigned to the project in 1956 and investigated mineral deposits in several areas northwest of the Kern River in the Sierra Nevada until mid-1957. His work was transmitted to

Paul K. Morton, who together with Bennie W. Troxel completed the field investigations of the metal deposits and assembled all the information into an integrated report.

George B. Cleveland provided the sections on clay and diatomaceous earth and part of the information for the sand and gravel section; Thomas E. Gay, Jr. provided the roofing-granule materials section and other descriptions; Harold B. Goldman provided the sand and gravel section; Cliffton H. Gray, Jr. provided the limestone, dolomite, and cement section; Earl W. Hart provided the petroleum fuels section; and William E. Ver Planck provided the borates, gypsum, magnesite, quartz and feldspar and salt sections, and the description of the Kramer borate district.

The geologic map (pl. 2) was originally compiled by Charles J. Kundert in 1955, but was modified by Morton and Troxel in 1959. Though many other people contributed to the information included on the map, the principal sources were unpublished maps compiled by Thomas W. Dibblee, Jr., of the U. S. Geological Survey.

Other contributors to the information contained below are Dion L. Gardner and René Engel, consulting geologists (unpublished descriptions of several mines); Charles W. Chesterman (unpublished data about tungsten deposits in the Rand and Indian Wells districts); William A. Bowes, Richard D. Miller, and Arthur J. Richards of the U. S. Atomic Energy Commission (unpublished data about uranium deposits); F. Harold Weber, Jr. (unpublished description of a tungsten deposit in Indian Wells district and assistance in mapping a mine in the Rand district); and several members of the U. S. Atomic Energy Commission, U. S. Bureau of Mines, and U. S. Geological Survey for allowing the use of information from their files. The base map for plate 1 was redrafted from a copy supplied by J. H. Hanks, Kern County Tax Assessor.

Much of the information presented in previous descriptions of mineral deposits in Kern County was incorporated in this report, especially descriptions by Reid J. Sampson and W. Burling Tucker.

Lauren A. Wright contributed many constructive suggestions at all stages of the manuscript preparation. Helpful suggestions and assistance were offered by many other members of the Division of Mines.

Glossary of Selected Geologic and Mining Terms

Listed below are some of the geologic and mining terms used in this report. They are defined in the sense that the present writers have used them. More complete definitions of these terms and definitions of terms not listed can be obtained from standard dictionaries or the following sources:

American Geological Institute, 1957, Glossary of geology and related sciences, Publication No. 501, Washington D.C. 325 p.

Fay, A. H., 1920, A glossary of the mining and mineral industry: U. S. Bur. Mines Bull. 95, 754 p.

Rice, C. M., 1951, Dictionary of geological terms, Edwards Brothers, Inc., Ann Arbor, Michigan, 465 p.

Adit. A horizontal or nearly horizontal mine passage from the surface. Commonly called a "tunnel". A drift adit follows a vein or ore body; a crosscut adit does not.

Alunitization. The introduction of, or replacement of minerals or rocks, by alunite (hydrous, potassium-aluminum sulfate).

Anhedral. The texture of mineral grains not bounded by their own crystal faces.

Amalgamation. The process of extracting metals by alloying with mercury and later expelling the mercury. Usually restricted to the recovery of gold.

Anticline. A fold or upward arch in rocks in which the layers are inclined away from each other.

Arrastre (arrastra). A mill in which ore is ground by an object being dragged over it in a flat, circular bed or basin. Used mostly in combination with amalgamation of gold ore.

Brecciated. Broken or crushed into angular fragments.

Collar. The mouth of a mine shaft.

Country rock. The rock along the walls of, or containing, a fault, vein, or ore body. Also host rock or wall rock.

Crosscut. A mine level or passage driven across the course of a vein or ore body (from another underground working).

Cyanidation. The chemical extraction of gold and silver from finely ground ore by dissolving in potassium or sodium cyanide, then precipitating the gold and silver by addition of another metal, usually zinc.

Dip. The maximum measureable inclined angle of any planar geologic feature at a given point; denoted in degrees downward from a horizontal plane.

Fault. A plane of rupture in rocks along which the rocks on one side have moved relative to those on the other side.

Fineness. The proportion of gold or silver in a mixture of the two; usually expressed in parts per thousand (900 fine = 90%).

Footwall. The underlying or lower wall of a fault, ore body, or vein.

Gangue. The worthless or undesirable part of a vein or ore body.

Glory hole. A surface excavation resulting from the mining of ore that is removed through underground passageways connected to the floor of the excavation.

Gossan (iron-hat). Iron-rich oxidized vein material in the upper parts of mineral veins containing iron sulfides.

Gouge. Fine-grained, usually soft, pulverized material lying along the wall of a fault or vein. Usually altered, pulverized rock.

Hanging wall. The overlying or upper wall of a fault, ore body, or vein.

Heads. See mill heads.

Isoclinal fold. A fold so tightly folded that the layers on each limb of the fold are inclined at the same angle.

Kaolinization. The process of alteration or replacement whereby kaolinite (hydrous aluminum silicate clays) is formed.

Lacustrine. Of or pertaining to lakes.

Left-lateral fault. A fault along which the separation is such that the side of the fault opposite an observer has moved relatively to the left.

Level. A designated horizontal plane or elevation in a mine, usually referring to a horizontal passage into or in a mine.

Lithology. The composition and description of rocks or rock units.

Metamorphic rocks. Rocks that have been changed without melting in response to pronounced changes of temperature, pressure, or chemical environment exclusive of weathering. "Meta" is commonly prefixed to the original rock name, e.g., metasedimentary rock = metamorphosed sedimentary rock.

Mill heads. The average percentage of valuable constituents in mined ore before it is beneficiated; usually the average of a day's production.

Milling ore. Ore that must be upgraded or concentrated before it can be shipped economically for further recovery of its valuable constituents.

Mill tails. The average percentage of valuable constituents in the discarded fraction (tails, tailings) of ore that has been beneficiated.

Modulus of rupture. A measure of the force which must be applied longitudinally in order to produce rupture.

Normal fault. An inclined plane of rupture in rocks along which the block above the plane apparently has moved downward relative to the other.

Ore pass. A vertical or steeply inclined underground opening through which ore is delivered by gravity from one level to another.

Ore shoot (pay streak, ore body). A concentration or body of ore, usually elongate.

the valley and Jurassic-Cretaceous marine sedimentary rocks in the west side of the valley. Pre-Jurassic crystalline rocks presumably underlie the Jurassic-Cretaceous sedimentary rocks but their nature has not yet been determined. Northwest-trending anticlines in the Tertiary strata are reflected by the outlines of gas and oil fields (pl. 1) and by low hills in the valleys.

The southern Sierra Nevada province, comprising the southern Sierra Nevada and the Tehachapi Mountains, contains most of the high mountains in Kern County. Cretaceous granitic rocks (Larsen and others, 1958) underlie most of the southern part of the province and are part of the Sierra Nevada batholith. The grantic rocks contain many roof pendants of pre-Cretaceous metasedimentary rocks. The pendants in the central part of the province trend northward, those in the northwest part trend north-northwest, and those in the southeast part trend northeast. The layering in the metasedimentary rocks generally is nearly vertical and strikes parallel to the long axes of the pendants. Many of the pendants are irregular in plan, posibly reflecting regional folds. Tertiary rocks, consisting of moderately to gently dipping nonmarine sedimentary rocks and intrusive and extrusive igneous rocks, occur locally in the province. The Sierra Nevada and Garlock faults form the east and southeast boundaries of the province.

Only the small southwestern tip of the Basin Ranges province—which includes several hundred thousand square miles in eastern California, southeastern Oregon, Nevada, and western Utah—lies in Kern County. The parts of the Basin Ranges province that lie within Kern County are El Paso Mountains, which form the south boundary of the province; Indian Wells Valley; and the east front of the Sierra Nevada, which forms the west boundary of the province. El Paso Mountains, trending east-northeast, parallel to the Garlock fault, lie athwart the normal north-northwest trend of ranges in the Basin Ranges province. El Paso Mountains contain Mesozoic granitic rocks, the only Palezoic rocks in the county that have yielded well-preserved fossils, and moderately thick Tertiary sedimentary rocks.

The Mojave Desert province, which includes most of the desert in southeastern California lying south of the Basin Ranges province, forms a westward-tapering wedge that is bounded by the San Andreas and Garlock faults. The northwest part of the wedge lies in southeastern Kern County. In Kern County, isolated buttes and small mountain masses of moderate to low relief are irregularly distributed on the gently undulating desert floor. Most of the area is underlain by Mesozoic granitic rocks which here and there contain isolated outcrops of pre-Cretaceous metasedimentary rocks and Tertiary igneous and sedimentary rocks. The most pronounced buttes rising above the desert floor consist of Tertiary volcanic rocks. Broad shallow basins in the province contain Quaternary playa-lake sediments but most of the desert floor is covered by Quaternary alluvium. Poorly exposed northwest-trending faults in the province commonly border Tertiary basins containing nonmarine sediments.

Precambrian? Rocks

In Kern County, rocks ascribed to the Precambrian era are confined to the southwestern part of the Tehachapi and El Paso Mountains and to the Rand Mountains (pl. 2), although some of the crystalline rocks in the San Emigdio Mountains may be of Precambrian age. The Precambrian? age assignments of these rocks has been made mostly because the rocks are metamorphosed to a higher degree than many of the Paleozoic rocks in southern California and consist of different rock types than the Paleozoic rocks. The accurate dating of these rocks is one of the important unsolved geologic problems in the county.

The Precambrian? rock units in Kern County are the Johannesburg gneiss and Rand schist (Hulin, 1925) in the Rand Mountains, the Mesquite schist (Dibblee, 1952) in El Paso Mountains, and the Pelona schist and an unnamed gneiss complex (Wiese, 1950) in the southwestern Tehachapi Mountains. The Rand schist and Pelona schist are similar both in lithology and in degree of metamorphism. Hershey (1902), Simpson (1934), and others have used these similarities to correlate the two widely separated units. The Mesquite schist has not been correlated with the Rand and Pelona schists because it is finer grained and appears to be less metamorphosed than either of them (Dibblee, 1952). The gneisses do not appear to have any counterparts in the county.

The Rand and Pelona schists consist mostly of mica-albite schist and amphibole schist and contain thin beds of limestone and quartzite. Both contain also thin lenses of white quartz. The Mesquite schist is mainly chlorite-quartz-albite-sericite schist with interbedded limestone layers. The Johnnesburg gneiss is composed of several types of hornblende-plagioclase gneiss and hornblende gneiss with interlayered limestone and quartzite. The gneiss complex in the Tehachapi Mountains consists of mica schist with interlayered marble and quartzite, nearly massive quartz-biotite-feldspar rock, and injection gneiss. The Rand schist is an estimated 2,000 feet thick (Hulin, 1925, p. 27); the Pelona schist is 5,000 feet thick in the Tehachapi Mountains (Wiese, 1950, p. 12); the Mesquite schist is 4,500 feet thick (Dibblee, 1952, p. 13-14); and the Johannesburg gneiss is an estimated 2,500 feet thick (Hulin, 1925, p. 23).

Most of the Precambrian? rocks consist of fine-grained sediments, some of which contain interlayered rocks of volcanic origin, and some of them were intruded in Precambrian? time by plutonic igneous rocks. The extent of the Precambrian? seas and igneous masses is obscure, as is the history of subsequent metamorphism, folding, and erosion of these rocks.

In the Rand Mountains, the Rand schist is one of the host rocks for gold, silver, and tungsten deposits. White quartz from lenses in the schist has been utilized for building stone and talc layers in the schist have been prospected. Elsewhere in Kern County the Precambrian?

rocks have been of little economic significance though some of the limestone bodies contain small tungsten deposits and some of the schists have been sources of minor amounts of flagstone.

Paleozoic Rocks

The rocks in Kern County that have been dated as Paleozoic are in isolated bodies in the Sierra Nevada, Tehachapi Mountains, San Emigdio Mountains, and El Paso Mountains (pl. 2). Most are metamorphosed strata that have been dated variously as "pre-Cretaceous, Carboniferous?, Permian (in part), and late Paleozoic"; some of them might be of Mesozoic age. Age assignments have been made largely on the basis of lithologic similarities with fossiliferous Paleozoic rocks in other parts of California. Part of the Garlock series in El Paso Mountains contains crinoid stems and fusilinids that indicate a middle or early Permian age (Dibblee, 1952, p. 17-19). "Poorly preserved indistinct remnants of what were once crinoidea" found by Goodyear (1888b, p. 310) in an unidentified marble quarry southwest of Tehachapi are the only other fossil remains that may be of Paleozoic age found to date in the county. Most of the pre-Cretaceous sedimentary rocks in the county appear to be too highly metamorphosed to yield identifiable fossils.

The Paleozoic rocks are roof pendants or inclusions in Mesozoic granitic rocks, ranging in length from a few hundred feet to about 30 miles and in width from a few tens of feet to about 4 miles. Many of them are too small to be shown on the geologic map of the county. The layering in most of the Paleozoic rocks dips steeply and commonly strikes parallel to the long axis of the pendant. The principal exception is the Garlock series in El Paso Mountains, which strikes nearly at right angles to the long axis of the main pendant in which it occurs.

Formation names have been applied to most of the Paleozoic rock masses in Kern County. The most widely accepted names are the Kernville series (Miller, 1931, p. 335-343) in the Sierra Nevada; the Pampa schist (Dibblee and Chesterman, 1953, p. 18-22), also in the Sierra Nevada; the Garlock series (Dibblee, 1952, p. 15-19) in El Paso Mountains; and the Bean Canyon series (Simpson, 1934, p. 381-383) in the Tehachapi Mountains. Many bodies of metasedimentary rocks of probable Paleozoic age in the San Emigdio, Tehachapi, and El Paso Mountains have not yet been studied in detail.

The Paleozoic rocks consist mostly of mica schist or phyllite which commonly contain interlayered quartzite, limestone, dolomite, calc-silicate hornfels, and—in the Garlock series and Pampa schist—metavolcanic rocks. The Garlock series, 35,000 feet thick if not repeated in folds (Dibblee, 1952, p. 15-19), is the thickest succession of Paleozoic rocks yet measured in Kern County. Elsewhere in the county, the thickest measured section of Paleozoic rocks is the Pampa schist which is an estimated 20,000 feet thick (Dibblee and Chesterman, 1953, p. 19).

Marine environments probably existed over much of Kern County during much of the Paleozoic era, although extrusive volcanic rocks—meta-andesite, meta-dacite, and meta-basalt—were deposited in at least three areas in the county—in El Paso Mountains, the Sierra Nevada, northwest of Tehachapi, and in the southwestern Tehachapi Mountains. The lack of recognizable unconformities in the Paleozoic rocks and the abundance of fine-grained sediments suggest that deposition of the strata occurred under uniform conditions and probably continuously, at least during late Paleozoic time; deposition probably continued uninterrupted into early Jurassic time.

Bodies of Paleozoic limestone have been the only source of the large volume of limestone for cement, lime, white roofing granules, and filler material produced in Kern County. Wollastonite was mined from one locality in the county and building stone has been obtained from several localities underlain by Paleozoic rocks. The principal metal deposits in the Paleozoic rocks are tungsten, gold, silver, antimony, lead, tin, and zinc. Barite, graphite, molybdenite, and iron in the Paleozoic rocks have been prospected.

Mesozoic Rocks

Mesozoic marine sedimentary rocks crop out in northwestern Kern County, and Mesozoic igneous rocks are widespread in Kern County east and south of the San Joaquin Valley.

The Marine sedimentary rocks consist mostly of the Franciscan group occupying fault-bounded wedges in the Temblor and southeastern Diablo Ranges and other rocks which comprise the bulk of the southeastern Diablo Range. These have been variously assigned to the Knoxville, Shasta, Chico, and other formations. Some of the metamorphosed unfossiliferous marine strata questionably assigned to the Paleozoic era may be of early Mesozoic age.

In Kern County the Franciscan group consists of chert, shale, sandstone, and limestone and is associated with bodies of serpentine and other basic igneous rocks (Arnold and Johnson 1910, p. 32-34). Only a small part of the stratigraphic section of the Franciscan group is exposed in Kern County. In recent years the Franciscan group has been considered to be in part late Jurassic and in part early Cretaceous; formerly it was considered to be wholly Jurassic in age. The Lower to Upper Cretaceous (Shasta-Chico) formations consist of about 11,000 feet of shale, sandstone, and conglomerate.

Mesozoic igneous intrusive rocks are abundant in the Sierra Nevada, Tehachapi Mountains, and San Emigdio Mountains, where they form about 70 percent of the total outcrops. They are also common in the Mojave Desert and El Paso Mountains. The igneous rocks range in composition from granite to gabbro; quartz monzonite and quartz diorite are the most common types. Isolated bodies of basic igneous rocks—ranging in size from a few feet in diameter to several miles in the shortest dimension—are enclosed in the younger acidic rocks. The igneous rocks in the Sierra Nevada and Tehachapi Mountains are part of the Sierra Nevada batholith which forms an 80-mile-wide belt about 400 miles long and is the largest Mesozoic batholith in the United States. Mesozoic

igneous rocks in the Mojave Desert, El Paso Mountains, and San Emigdio Mountains also appear to be part of the Sierra Nevada batholith.

Larsen and others (1958, p. 49, 50, 52-53, 60) conclude from results of lead-alpha age determinations made on samples of granitic rocks collected in the Sierra Nevada, including one sample of granodiorite collected near the Kern River in Kern County, that the Sierra Nevada batholith is probably early Late Cretaceous in age.

Marine deposition of fine-grained sediments probably continued from Paleozoic time into the Triassic period in parts of Kern County, although Triassic rocks have not been definitely recognized in the county to date. Many thousands of feet of fossiliferous Cretaceous marine sediments were deposited in the northwestern part of Kern County following deposition of marine strata of Jurassic-Cretaceous Franciscan group. The Jurassic and Cretaceous seas extended southeastward as far as the vicinity of Taft. Nearly simultaneously, batholithic rocks were being emplaced in the roots of the Sierra Nevada and in the Mojave Desert area. Older rocks in these areas were metamorphosed, tilted, folded, uplifted, and subsequently eroded. These events occurred in a remarkably brief span of geologic time and were the beginning of a succession of geologic events that is continuing today. Since the close of the Cretaceous period, most of the Mojave Desert, Sierra Nevada, and Basin Ranges provinces has remained above sea level.

The principal mineral deposits associated with the Mesozoic igneous rocks are tungsten, copper, and gold. Although many of these deposits are not wholly within Mesozoic rocks, their origin is closely associated with the late stages of emplacement of the batholithic rocks. Uranium deposits in the Kern River area lie in fractured granitic rocks.

Tertiary Rocks

Tertiary rocks are widespread in the western half of Kern County, although they are largely covered by alluvium in the San Joaquin Valley, and occur as isolated outcrops in southeastern Kern County (pl. 2). In western Kern County, the rocks are principally marine strata, which were deposited nearly continuously from Cretaceous to Pleistocene time. Eastward, along the western foothills of the Sierra Nevada, the Tertiary sediments consist largely of nonmarine strata. In the Mojave Desert, El Paso Mountains, and parts of the southern Sierra Nevada, Tertiary continental and volcanic rocks were deposited during most of the Tertiary period, but deposition and volcanism were not continuous. The Tertiary marine strata in the San Joaquin Valley and eastern Temblor Range consist of about 30,000 feet of shale, sandstone, conglomerate, silt, and claystone. They have been assigned a large number of formation names; most of them are listed on plate 2, and a few are mentioned below.

Most of the marine rocks assigned a Paleocene age by early workers have been assigned ages of late Cretaceous or early Eocene by later workers. The principal Eocene formations are the Tejon formation, Point of Rocks sandstone, Kreyenhagen shale, and Famosa sand. In Kern County, the Eocene strata apparently attain their maximum thickness of more than 6,000 feet beneath parts of the San Joaquin Valley. Marine Oligocene rocks, a maximum of about 1,000 feet thick, are included in the Oceanic sand, Tumey shale, Wagonwheel formation, and the San Emigdio and Pleito members of the San Lorenzo formation. Miocene strata attain a maximum thickness of more than 12,000 feet. They have been included in many formations, some of the most commonly used names being Vaqueros sandstone, Maricopa and Monterey formations, Santa Margarita sand, and McDonald shale. Many other Miocene formation names have been applied and are used by petroleum geologists (see pl. 2 in pocket and table 15 in petroleum fuels section). Pliocene marine strata are about 6,000 feet thick. They are most commonly included in the Etchegoin and San Joaquin formations and the marine facies of the Chanac formation.

Continental sedimentary rocks, including pyroclastic rocks, in Kern County consist mostly of coarse fanglomerates, fine-grained lake sediments, and interlayered volcanic ash beds. They are mostly in isolated outcrops except along the east and south margins of the San Joaquin Valley where coarse sediments form continuous outcrops. Most of the rocks are included in formations that have not yet been satisfactorily correlated with one another. The oldest Tertiary continental sedimentary rocks in Kern County are in the Paleocene Goler formation (Dibblee, 1952, p. 22; McKenna, 1955, p. 512-515), which is 6,500 feet thick and crops out over a large part of El Paso Mountains. The Oligocene Walker formation and Bealville fanglomerate in eastern San Joaquin Valley comprise about 3,000 feet of coarse terrestial sediments. The Tecuya formation, about 2,000 feet thick, in southern San Joaquin Valley (Hoots, 1930, p. 262) and the Witnet formation, about 4,000 feet thick, in the Tehachapi area (Buwalda, 1954, p. 134) are also probably Oligocene in age. Miocene continental rocks include the Bena formation, 2,500 feet thick, along the western front of the Sierra Nevada (Dibblee and Chesterman, 1953, p. 38); the Kinnick and Bopesta formation, about 5,000 feet thick, in the Tehachapi area (Buwalda, 1954, p. 134-135); and the lower part of the Tropico group in the Mojave Desert (Dibblee, 1958, p. 135-144). The principal Pliocene formations are the continental facies of the Chanac formation, about 1,000 feet thick, in southern San Joaquin (Hoots, 1930, p. 292-293); the lower 5,500 feet of the Ricardo formation in El Paso Mountains (Dibblee, 1952, p. 30); the Horned Toad formation, about 1,000 feet thick, in low hills northwest of Mojave (Dibblee, 1958, p. 143); the Plio-Pleistocene McKittrick, and Tulare formations, about 2,000 feet thick, and the Kern River formation, about 1,200 feet thick, occur in the San Joaquin Valley.

Intrusive and extrusive rocks of Oligocene to Pliocene age are erratically distributed through the southern and southeastern part of Kern County. They are predominately of andesitic to rhyolitic composition.

Folded basalt flows, andesite agglomerate, and basalt sills of early and middle Miocene age crop out between Tecuya and Pleito Creeks in the Pleito Hills at the southern end of the San Joaquin Valley. The only volcanic rocks on the western flank of the Sierra Nevada are a few patches of the Miocene Ilmon andesite which crop out north of Caliente Creek near Ilmon and Bena sidings (Dibblee, 1952, p. 38).

Extensive andesite flows underlie several tens of square miles in an area centered about 10 miles northeast of Tehachapi. Although not accurately dated, they are no older than Pliocene (Buwalda, 1954, p. 135), and may be correlative with andesite of early Pleistocene age (Samsel, 1951, unpublished report) in Jawbone Canyon about 25 miles northeast of Tehachapi. Also in Jawbone Canyon, are about 2,300 feet of vesicular basalt and welded volcanic tuff breccia which are similar to Miocene rocks near Tehachapi.

Rhyolite plugs and dikes are common in the area between Monolith and the mouth of Jawbone Canyon. They are ill-dated but are probably middle Tertiary (Samsel, 1951, unpublished report).

Basalt and andesite flows aggregating as much as 550 feet in thickness are interbedded with sediments in the Pliocene Ricardo formation on the northwestern and western slopes of El Paso Mountains.

In the Mojave Desert region of Kern County, widely distributed basalt flows and quartz latite and rhyolite intrusive masses are included by Dibblee (1958, p. 135-144) in the Tropico group of Mio-Pliocene age. These volcanic rocks are mostly in the vicinity of Soledad Mountain (Bobtail quartz latite member) and Boron (Saddleback basalt).

Uplift and concurrent erosion of most of the Sierra Nevada and Mojave Desert continued throughout the Tertiary period and are still continuing today. The Arvin-Tehachapi earthquake of July 1952 is evidence of this continuing activity. Marine sediments accumulated in the San Joaquin Valley and Temblor Range areas, upon the floors of Tertiary seas whose margins fluctuated rapidly and repeatedly due to continual warping of rocks underlying these areas. The seas extended inland from the present coast line of the Pacific Ocean as far east as the western foothills of the Sierra Nevada and south to the central part of the San Emigdio Mountains. The Sierra Nevada and Mojave land masses contributed large volumes of sediments to the bordering sea floors and to lakes occupying basins within these provinces. Coarse fanglomeratic material accumulated along the margins of the Sierra Nevada, San Emigdio Mountains, and elsewhere. Most of the basins in the Mojave Desert and bordering areas received sediments during only parts of the Tertiary period, and apparently only a few were receiving sediments simultaneously at a given time. Volcanic activity resulting in the emplacement of shallow intrusive rocks, extrusive flows, and pyroclastic sedimentary rocks occurred several times, mostly during the Miocene and Pliocene epochs.

Movement along the ancestral San Andréas, Garlock, and Sierra Nevada faults probably began during the Tertiary period, if not before, and continued intermittently. Petroleum fuels probably accumulated in some of the early formed structural traps in the Tertiary marine strata.

The most valued mineral resources associated with Tertiary rocks in Kern County are the petroleum fuels. These accumulated in folds, against faulted beds, and in stratigraphic traps in the Tertiary marine rocks in the southern San Joaquin Valley. Boron deposits near Kramer are in Tertiary continental rocks, and rock products are obtained in large part from loosely consolidated Tertiary and Quaternary gravels and fanglomerates. Many of the Tertiary rocks in the county contain clay deposits.

Placer gold, probably derived from reworked Paleocene sedimentary rocks, has been mined in El Paso Mountains. Lode gold, silver, mercury, and antimony deposits are in quartz-rich Tertiary intrusive rocks in several districts in the county. These deposits are probably genetically related to the intrusive rocks. In the Mojave district, the gold-silver veins are in quartz latite porphyry and rhyolite. Silver, gold, and antimony deposits are found in rhyolite dikes in the Loraine district, and the mercury deposits northwest of Tehachapi in rhyolite.

Quaternary Rocks

Rocks of Quaternary age in Kern County are mostly continental sedimentary rocks which locally are interlayered or overlain by basalt flows of Pleistocene age. The basalt flows, in turn, are overlain by Recent alluvium. The sediments occupy the floors of the San Joaquin Valley, the Mojave Desert, and Indian Wells Valley—about half the land-surface area of the county. The basalt crops out in the northern part of El Paso Mountains and in the Tehachapi Mountains east of Tehachapi.

The Pleistocene rocks are mainly stream-terrace deposits composed of alluvium, sand, and gravel. Some of the coarse sediments, such as those along San Emigdio Creek, are sources of large quantities of sand and gravel for aggregate.

The Kern County area was largely a land area in Pleistocene time. Lacustrine, alluvial-plain, and alluvial-fan deposits were laid down in numerous basins, and locally basalt flows covered them. The land surface probably did not differ greatly from its present form.

Recent fanglomerates, stream gravels, and alluvium overlie large segments of the valleys in Kern County. The coarse fractions of the Recent sediments are utilized for aggregate.

Recent playa-lake sediments, which cover many of the dry lakes in Kern County, are utilized as a source of clay, particularly oil-well drilling mud.

Structural Features

Several structural features of regional geologic significance lie in Kern County (fig. 4). Three major faults—the San Andreas, Garlock, and Sierra Nevada—separate widely different geologic provinces, and the south end of

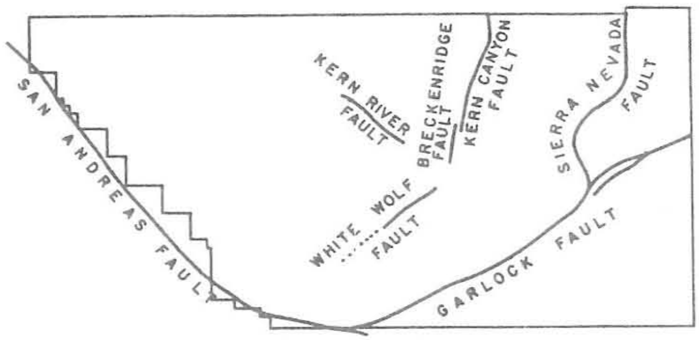


Figure 4. Sketch of the principal faults in Kern County.

the San Joaquin Valley is underlain by the south end of a major syncline. Additional faults and folds of less magnitude abound in Kern County; many of them were important factors in determining the position of mineral deposits.

The San Andreas fault, a right lateral fault (the side opposite an observer is offset relatively to the right) has a total length of at least 600 miles. In Kern County it strikes about N. 40° W. along the west side of the county, but swings to about N. 75° W. in the southern part of the county near Frazier Park. Movement has occurred along segments of the fault in historic time, but the age and total displacement along it are subjects of controversy among geologists. In Kern County the San Andreas fault is bounded by widely different rock units, and the southwest end of the Garlock fault is terminated by the San Andreas fault near Frazier Park.

The Garlock fault, 150 miles long, extends northeastward through the central part of the Tehachapi Mountains, then along the southeast flank of the Tehachapi, Sierra Nevada, and El Paso Mountains. Left-lateral movement (the side opposite an observer is offset relatively to the left) is characteristic along this fault, but its maximum horizontal displacement appears to be much less than that along the San Andreas fault. Hulin (1925) suggests a left-lateral displacement of approximately 6 miles. Movement has taken place in Recent time. Vertical displacement along the San Andreas and Garlock faults, though largely undetermined, may be large.

The Sierra Nevada east-dipping normal fault system (the east block has moved relatively downward) extends more than 300 miles, along the entire east front of the Sierra Nevada. The Sierra Nevada block rose along it and was tilted westward to form the abrupt and spectacular east front of the Sierra Nevada that lies west of several arid valleys and mountain ranges. The fault is exposed near the mouth of Jawbone Canyon where it terminates against the Garlock fault. Northward from this termination it follows a poorly exposed, irregular course. Movement along it, too, has been recorded in historic time.

Other faults in Kern County of regional significance, are the Kern Canyon-Breckenridge-White Wolf system which cuts south to southwestward through the central part of the Sierra Nevada (fig. 4). The White Wolf fault, the southernmost segment of the system, has been intensively studied by seismologists and geologists since the Arvin-Tehachapi earthquake occured along it in 1952. The Kern River fault, a west-dipping normal fault exposed at the mouth of the Kern River, is one of the few faults exposed along the western front of the Sierra Nevada. Numerous reverse faults (down-dip block has moved relatively upward) in the north flank of the San Emigdio Mountains cut through Tertiary rocks and have been closely studied to determine whether accumulations of petroleum have been trapped against them or whether petroleum-bearing structures lie concealed beneath them. Most ore deposits in Kern County, as elsewhere, lie along faults and fractures. In general, these faults are relatively minor ones whose relationships to regional structures are not fully determined.

Table 3. Mining districts in Kern County.

Names in previous reports	Names in this report
Agua Caliente	Loraine
Amalie	Loraine
Atolia	Rand
Big Dixie	El Paso Mountains
Black Mountain	El Paso Mountains
Claraville	Piute Mountains
Clear Creek	Clear Creek
Cove	Cove
	Erskine Creek
Garlock	El Paso Mountains
Goler	El Paso Mountains
Gorman tin	Gorman tin
Green Mountain	Piute Mountains
Greenhorn Mountain	Greenhorn Mountain
	Greenhorn Summit tungsten
Havilah	Clear Creek
	Indian Wells Canyon
Isabella	Erskine Creek
	Jawbone Canyon
	Kern River Canyon
	Kernville tungsten
Keyes, Keyesville, Keysville	Keysville
	Kramer borate
Long Tom	
Mohave, Mojave	Mojave
Paris	Loraine
Pioneer	Piute Mountains
Piute Mountains	Piute Mountains
Rademacher	Rademacher
Rand, Randsburg	Rand
	Red Mountain tungsten
Redrock	El Paso Mountains
Rosamond	Mojave
Sageland	Piute Mountains
San Emigdio	San Emigdio
Searles	Rademacher
Stringer	Rand
Summit	El Paso Mountains
Tehachapi	Tehachapi
	Temblor
Valley View	Piute Mountains
Vaughan	Piute Mountains
Weldon	Weldon
White River	Woody
Woody	Woody

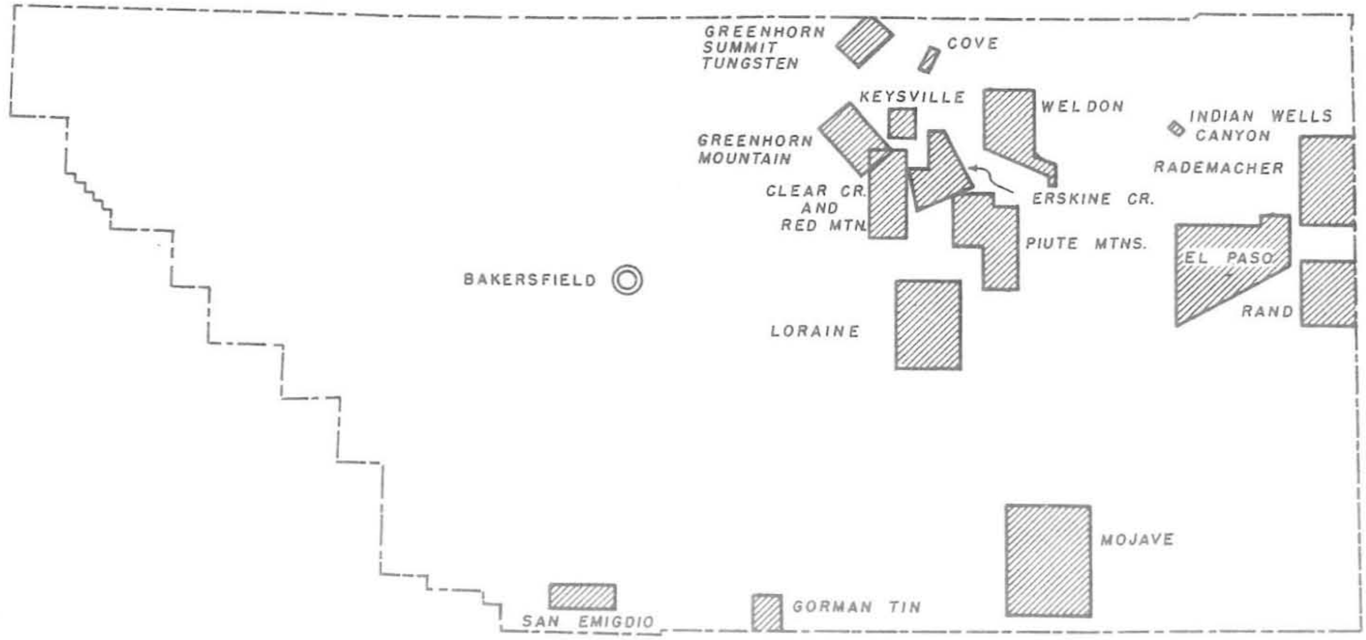


Figure 5. Index to maps of mining districts.

The largest fold in Kern County is the syncline that underlies San Joaquin Valley. It is a downwarp that lies parallel to and west of the Sierra Nevada; during Tertiary time it was the principal basin occupied by the seas. Sediments derived from the Sierra Nevada were transported into this trough, which continued to subside as the Sierra Nevada continued to rise. Sedimentary debris from the Sierra Nevada continue to be transported to the San Joaquin Valley today.

Most of the Tertiary rocks within the broad regional fold are folded into many smaller anticlines and synclines which have yielded a large proportion of the petroleum in the county. All of the early discovered oil fields in the county were found by drilling along the crests of anticlines. Probably many of the metasedimentary rocks in the county are folded also, though little geological work has been done to substantiate this.

MINING DISTRICTS

Nearly all of the mineral deposits in Kern County, exclusive of petroleum fields and some of the deposits of nonmetallic minerals such as clay and gypsum, are grouped in areas that are referred to herein as "Mining Districts". The general geology and mining history of twenty-two of these districts or areas are described below. Geological features that are common to two or more mines within individual districts are emphasized in hope that they will prove helpful aids in future exploration.

The names of districts used herein do not necessarily conform with formal names recognized in previous reports. Most of the districts described in the following paragraphs include one or more formal mining districts, most of which were described by Hill (1912, p. 120-122), Brown (1916, p. 482-485), and Tucker and Sampson (1933, p. 280-286). Table 3 lists the names of mining districts in Kern County with a notation of which district described in this report encompasses them (see also fig. 5).

Clear Creek District

The Clear Creek or Havilah district is in northeastern Kern County about 26 miles east-northeast of Bakersfield and 5 miles south of Bodfish. It comprises an area of about 40 square miles (fig. 6) which is bounded approximately by Hobo Ridge on the west, Kern River on the north, Walker Basin on the south, and Bald Eagle Peak on the east. The district has yielded principally gold and tungsten, but deposits of placer gold, antimony, uranium, and rare earths also have been found.

The earliest discoveries of gold at Clear Creek were made in 1864 by Claude de la Borde, George McKay, Benjamin T. Mitchell, and Hugh McKeadney (Boyd 1952, p. 39). In 1865 the town of Havilah was established at the center of an elongate north-trending valley which traverses the area, and by the winter of 1865-66 had attracted an estimated 3,000 people. In 1867 it became the first seat of Kern County, an honor which it held until 1874 when the county seat was moved to Bakersfield.

The Clear Creek district is underlain mostly by plutonic igneous rocks of Mesozoic age, which range in composition from quartz diorite to gabbro, although quartz diorite predominates. Roof pendants of pre-Cretaceous metasedimentary rocks lie along a narrow north-trending belt that traverses the north-central part of the district northwest of Havilah. The Red Mountain area, just north of Walker Basin, is underlain by similar rocks. These metasedimentary rocks strike generally north and

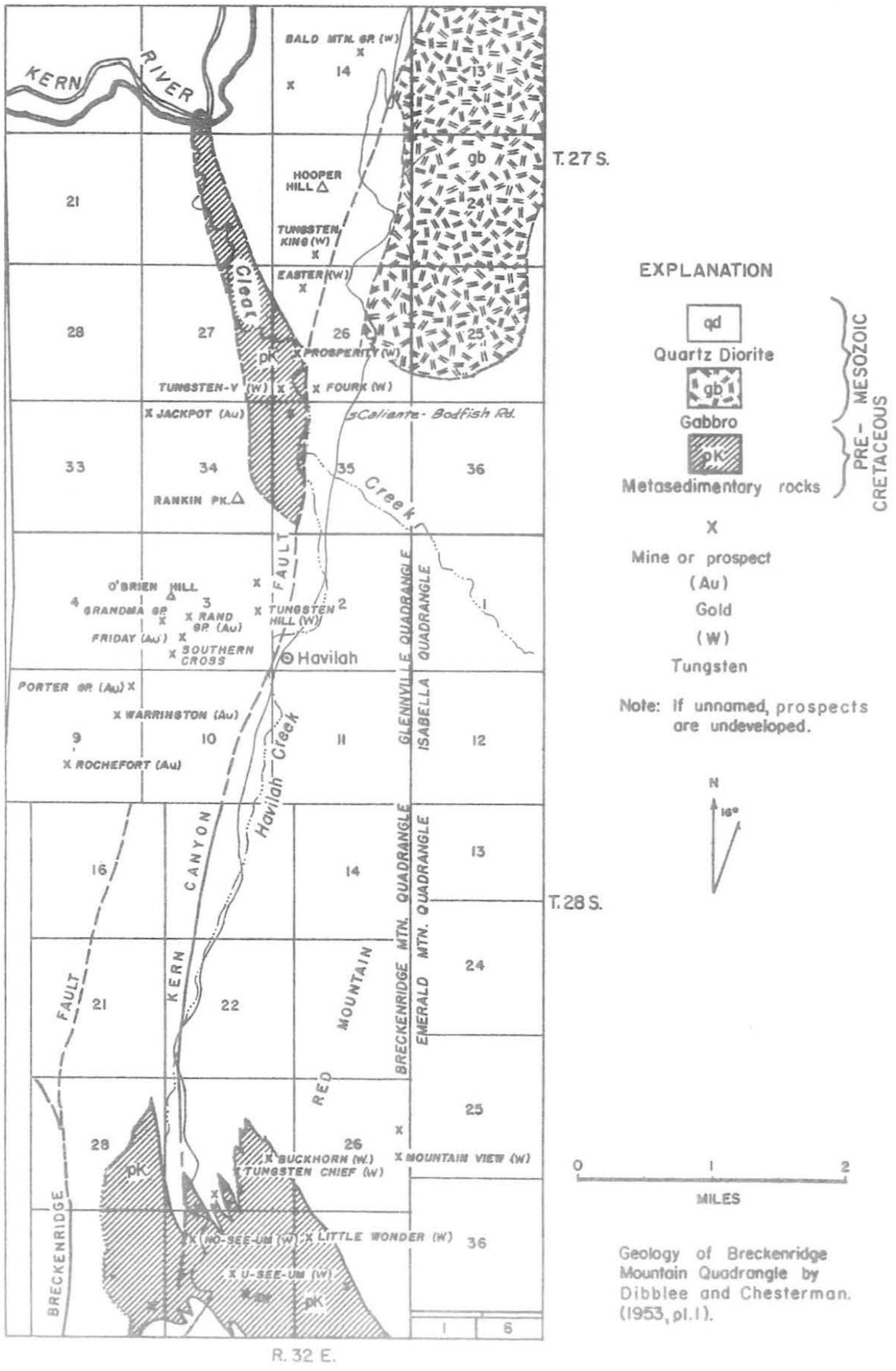


Figure 6. Geology and mines of the Clear Creek and Red Mountain districts.

nearly everywhere dip vertically. Several elongate, north-trending pegmatite dikes intrude the plutonic rocks east of Havilah Creek, which flows north through Havilah.

The mineral deposits, almost without exception, lie along north- to northeast-trending structural features. Most of the gold deposits are in a group of veins that strike N. 45° E. and dip steeply to the southeast. Although the veins are discontinuous, they form a zone about 1,000 to 2,000 feet wide that extends from the area just north of Flying Dutchman spring to the base of Rankin Peak, a distance of approximately 4 miles. Individual veins range in width from 3 inches to 6 feet, and most of them can be traced for several hundred feet along the surface. They are composed typically of quartz and fault gouge in which are small grains of arsenopyrite, pyrite, and free gold. Silver is generally present in small proportions, probably in solid solution with the gold, as no silver minerals have been recognized. Many of the ore shoots are at or near junctions of the principal vein with converging cross fractures, although some of the ore shoots have no apparent structural control.

Tungsten minerals are present in both quartz veins and tactite zones. The tactite bodies typically are lenticular and 1 to 15 feet wide. They are irregularly disposed along the margins of roof pendants, or are adjacent to small masses of granitic rock within the metamorphic rocks. In these bodies the tungsten is in disseminated grains of scheelite in a gangue composed principally of quartz, garnet, calcite, and epidote. The tactite can be recognized easily by its characteristic brown and green color. In the Clear Creek district tactite bodies formed as a replacement of limestone are more common than those formed by replacement of other sedimentary rocks.

The scheelite-bearing quartz veins of the district (Tungstein King, Bald Mountain group), although not in contact with the roof pendants, are within a few hundred feet of them. These veins, which are all in the vicinity of Hooper Hill (formerly Bald Mountain), strike about N. 30° E. and dip 60° to 80° SE. The veins contain disseminated scheelite crystals, and scattered crystals of pyrite.

Three-quarters of a mile northeast of Havilah at the Alice mine antimony is found in scattered patches within a north-trending pegmatite dike.

Radioactivity has been noted in several pegmatite dikes in the district and has been attributed, in at least one occurrence, to the presence of cyrtolite, a uranium- and rare-earth-bearing zircon. No economic concentrations of radioactive minerals have been found in these dikes.

Cove Mining District

By Thomas E. Gay, Jr.

The Cove district includes 30 or more claims on the west side of the Kern River Valley, 2 to 4 miles south of the new town of Kernville, near the west shore of Lake Isabella. Most of the more productive mines are gold mines in section 28, T. 25 S., R. 33 E., M.D.M. (fig. 7). The Cove district has been referred to in recent reports as the Big Blue group because the Big Blue mine was one of the more important mines in the later active years of the district. A comprehensive report on the history, geology, and operations of the Big Blue group was written by J. W. Prout (1940). The dozen or more productive mines in the district were active during various periods from 1860 to 1943. The Big Blue mine was closed in 1943 by War Production Order L208 and no gold has been mined since then. The following description of the district is based on Division of Mines reports, mainly Dr. Prout's (1940), on property visits, and on conversations with Dr. Prout in 1955.

In 1851 the discovery of placer gold brought a rush of prospectors to the Kern River basin. The placer deposits proved to be disappointing in number and quality to most of the gold seekers, although daily recoveries of $16 to $60 were reported by a few miners. Placer values in the river banks and bars in the Cove district were low, and by 1855 most of the prospectors had departed.

In 1860, quartz-bearing float was traced to an outcrop, which became the discovery point for the Big Blue mine. The lusty mining camp of Quartzburg was established near the present site of the Big Blue mill, and the Cove district commenced a period of essentially continuous—though incompletely documented—activity, which lasted until 1883 when a serious mine fire occurred. Arrastras, Chilean mills, and, later, stamp mills with amalgamation machinery, powered mainly by Kern River water, were used to recover an estimated total of several million dollars in gold prior to 1883.

Details of the ownership and operation of the mines in the district prior to 1875 is largely undetermined. Lovely Rogers, who discovered the Big Blue vein, evidently did the first lode mining, about 1862. A score or more of claims along and adjacent to the Big Blue vein were staked by miners who worked them individually during most of the 1860s, and apparently made large recoveries from high-grade, near-surface ore bodies. Values were reported to be as high as $300 per ton in free gold. In 1868 Judge J. W. Sumner consolidated part of the mining interests and produced a substantial amount of gold. During the period 1856-76 the principal mine was reported to be the Sumner. The lode was 80 feet wide and average yield of the mined material was about $18 per ton (Raymond, 1875). An "old" 16-stamp custom (?) mill was said to have yielded a profit of $100,-000 to $300,000.

In 1875-76 Senator John P. Jones of Nevada consolidated all water and mining rights in the Cove district and formed the Sumner Gold and Silver Mining Company. This company constructed and operated new 16- and 80-stamp mills, powered by a 54-inch water turbine. A steam plant was erected to power walking-beam Cornish pumps to dewater the six-compartment Sumner (or "Engine") shaft, which was then 400 feet deep and the principal mine opening.

In 1881 the holdings were leased to Michaels, Freidlander and Company, who operated them until late 1883

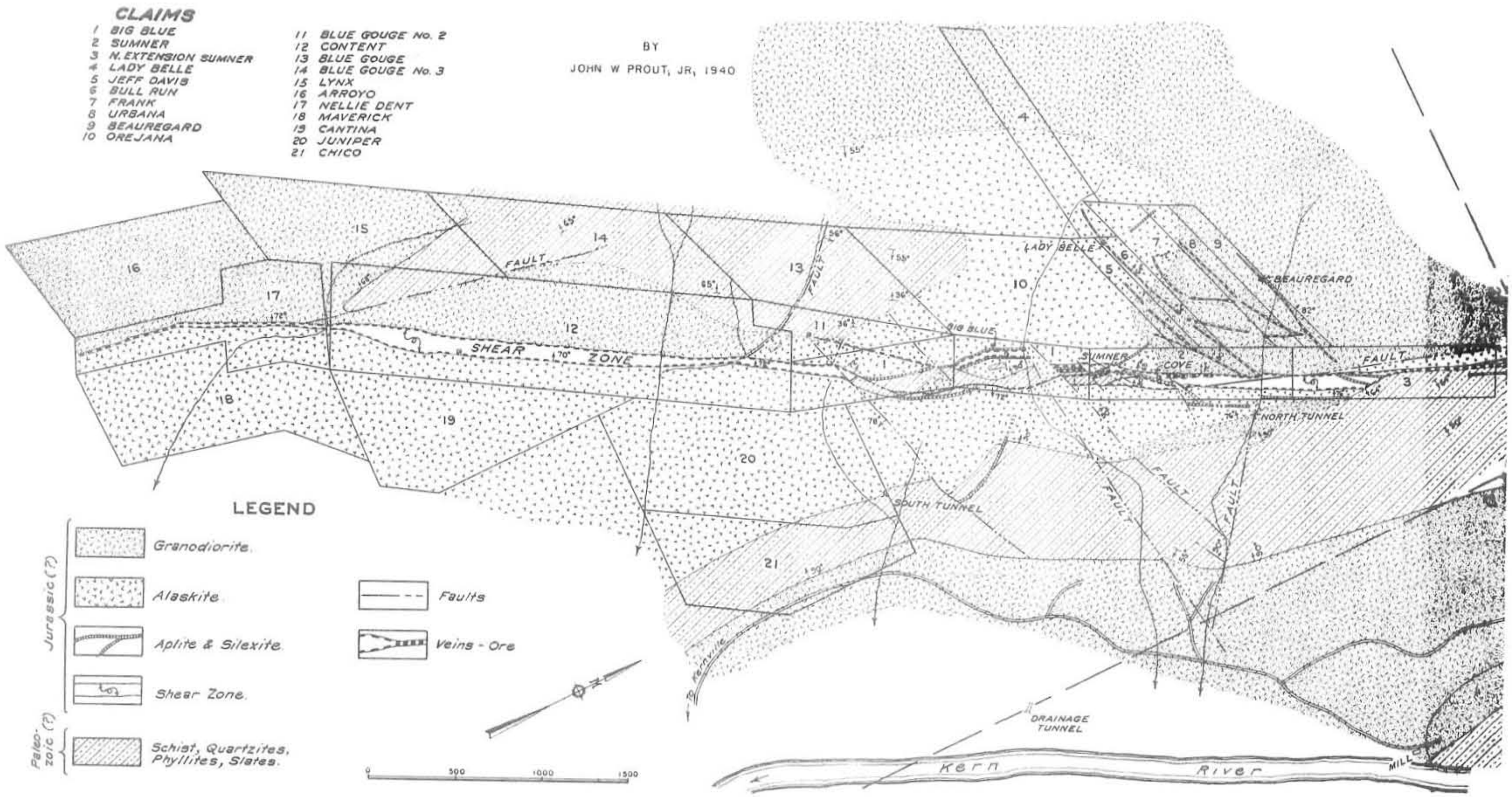


Figure 7. Geology and claims of part of the Cove district.

when the property was ravaged by fire. The underground workings continued to burn for several years and most of the workings above the 260 level caved.

From 1883 to 1934 the district was essentially unproductive, although several attempts were made to restore the mine to its former productivity. Between 1894 and 1900, probably about $50,000 in gold was recovered during intermittent operations. In 1924 the total production of the Cove district was estimated at $5,000,000 to $8,000,000 (Tucker, 1924, p. 35). From 1907 to 1926 the property was owned by the Kern Development Company, who reopened some of the lower workings and leased various portions of the property, but no commercial production resulted.

In 1927, a Mr. Jubien leased four of the previously more productive claims, but drifting and diamond drilling on the 260 level failed to reveal commercial ore bodies and the lease was relinquished.

From October 1931 to September 1932 the American Smelting and Refining Company leased the same four claims and explored by means of drifts and winzes on the 260 and 400 levels; again no production resulted.

In 1934 a group later known as the Big Blue Mining Company was organized by A. V. Udell to operate the property (Prout, 1940, p. 385). Another mill was constructed and considerable development workings were driven but the company became bankrupt and their interest in the properties was bought out in April 1935 by Kern Mines, Inc., who are the present owners (1958). From 1936 to 1943 deposits that center about the Big Blue claim were continuously worked, yielding several hundred thousand tons of ore from which gold valued at more than a million dollars, and lesser amounts of silver, lead, and copper were recovered. In 1943, the Government closing order L208 caused the mine to be shut down permanently.

The Big Blue mill and the portal of the mine drainage tunnel are at lower elevation than the spillway of Lake Isabella dam, which was constructed by the U. S. Army Corps of Engineers in 1948-53. Hence the workings would be subject to flooding when the reservoir is filled to capacity. In 1954, to complete the reservoir project, the Corps of Engineers acquired all land below elevation 2617, including the mill and drainage tunnel portal. In 1955 a watertight bulkhead was constructed across the drainage tunnel by the Corps of Engineers, and a pump installed to dispose of mine drainage waters. In 1957 the mill was sold at auction, and removed to New Mexico.

The principal rock units of the Cove district are the Mesozoic Isabella granodiorite, including aplitic and alaskitic phases, the Carboniferous (?) schist, quartzite, and phyllite of the Kernville series (Miller and Webb, 1940; Prout, 1940). Gold mineralization has been localized mainly within two intersecting systems of faults and shear zones. The principal vein system, the Big Blue or Sumner lode, is a sheared and faulted zone, in places as wide as 125 feet, that strikes about N. 30° E., and dips about 70° NW. This zone, known as the Big Blue-Sumner shear zone, can be traced laterally on the surface for more than 8,000 feet, and contains many subordinate faults, splits, and sheared zones. Another group of veins, the Lady Belle group, lies west of the Big Blue-Sumner shear zone. It dips 60° to 80° SW., and terminates against the west side of the northern portion of the Big Blue-Sumner shear zone.

Gold, ranging from 650 to 700 fine, occurs in both vein systems. In some places it is not associated with other metallic minerals. In other places it is accompanied by arsenopyrite, galena, and sphalerite. Other metallic minerals reported in the ore include magnetite, marcasite, pyrrhotite, scheelite, molybdenite, bismuthinite, sphalerite, and stibnite (Prout, 1940, p. 411-413).

The main mines of the Cove district can be divided into two groups: those on the Big Blue-Sumner shear zone, including, from south to north, Nellie Dent, Content, Blue Gouge No. 2, Big Blue, Sumner, and North Extension Sumner; and those on the Lady Belle vein system, including, again from south to north, the Lady Belle, Jeff Davis, Bull Run, Frank, Urbana, and Beauregard. Other claims adjacent to those listed above were worked, but few data are available concerning them. The available records are not entirely clear as to which portions of the district were active at particular times, nor as to which portions of the various ore bodies were the most productive.

The mines of the Lady Belle group of veins yielded high-grade ore from about 1862 through the early 1880s, but they have been practically inactive since then. The mines on the Big Blue-Sumner shear zone had about the same early history as those of the other group, but were also intermittently active in the early 1900s, with peak productivity from 1936 to 1943. Mines of both groups were worked individually in the early years of the district, but most of the production resulted at times when the district was consolidated under unified management, such as that of the Sumner Gold and Silver Mining Company (1875-81), and Kern Mines Incorporated (1936-43). Although the veins of the Lady Belle system differ geologically from the Big Blue-Sumner veins, the two systems were mined through the same workings after the fire of 1883 made most near-surface portions of the Lady Belle system inaccessible. Published records, which do not include details of the district's earliest years, suggest that the Big Blue-Sumner mine was the most productive. It has the longest history of activity, the greatest recorded production, the deepest and longest workings, and has been the main means of underground access to several adjacent claims during consolidated operations.

El Paso Mountains District

El Paso Mountains (fig. 8), which trend east-northeastward on the north edge of the Mojave Desert in northeastern Kern County, are about 25 miles long and 4 to 10 miles wide. Placer gold, pumice, pumicite, and clay are the principal mineral products of the area. Lode gold ore, coal, and copper ore also have been mined.

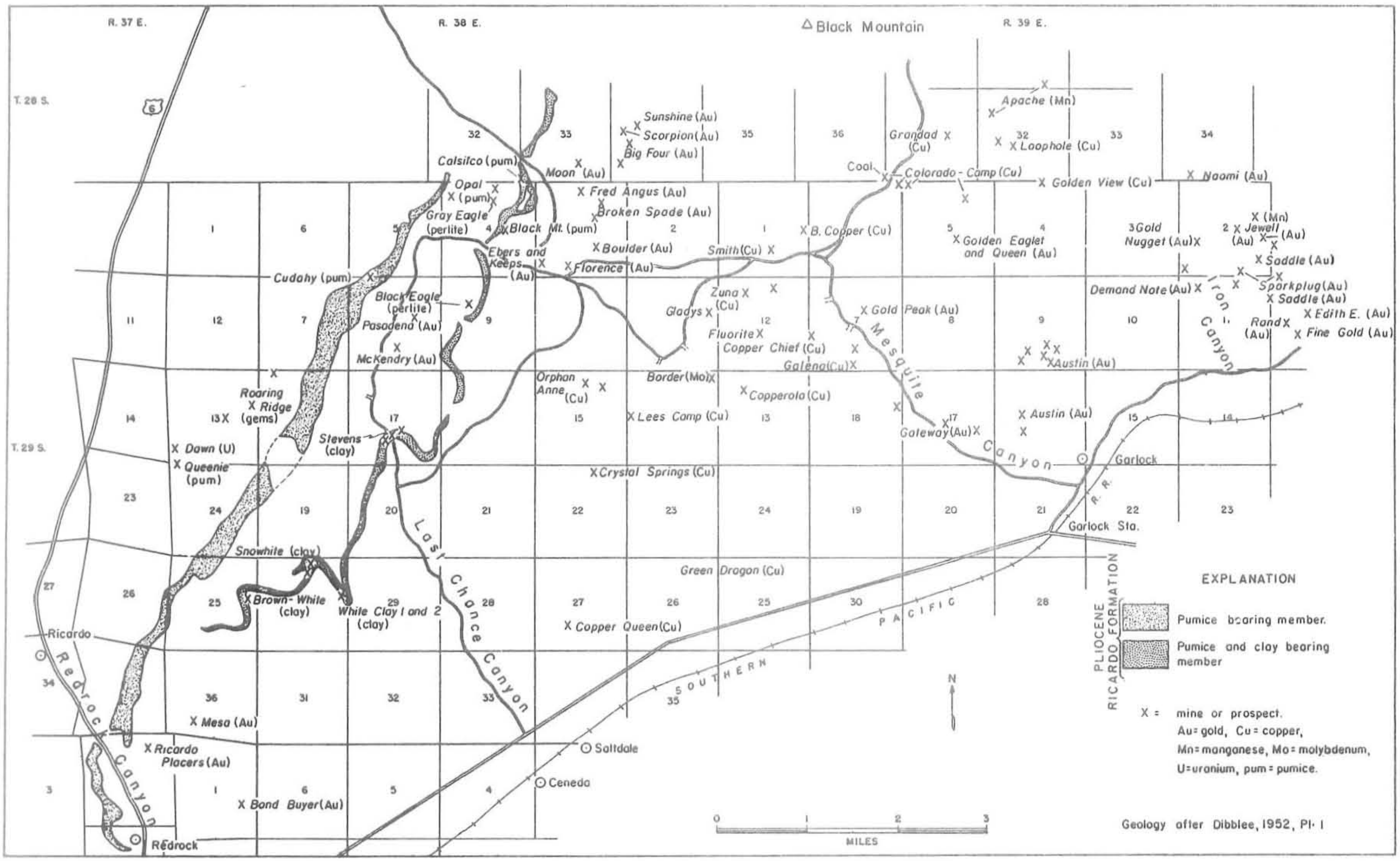


Figure 8. Mines and principal prospects in western El Paso Mountains.

Manganese, uranium, perlite, molybdenum, and lead prospects in the area have been explored. Some of the rocks may eventually be quarried as ornamental stone. The northwestern part of El Paso Mountains is a popular area for collecting fluorescent and fire opal, silicified palm, jasper, agate, and other material suitable for cutting and polishing. The gross value of all mineral products obtained from deposits in El Paso Mountains probably exceeds several hundred thousand dollars—mostly for placer gold, pumice, and pumicite.

The geology of El Paso Mountains has been mapped and described by Dibblee (1952). Metamorphosed sedimentary Permian (in part ?) rocks overlie Precambrian? schist and crop out in the northeastern part of the range. Quartzite conglomerate and hornfels (Jurassic-Triassic ?) crop out at the southwestern part of the range. These Precambrian? to Jurassic? rocks are intruded by Mesozoic rocks of quartz diorite to granite composition which crop out mostly in the southwestern part of the range. The Goler formation, of Paleocene age (McKenna, 1955, p. 512-515), unconformably overlies the older rocks and is in turn unconformably overlain by the Plio-Pleistocene Ricardo formation. Both of these Tertiary formations are composed largely of continental deposits and lie northwest of the main part of the range.

The metasedimentary and intrusive rocks are the host rocks for copper, gold, lead, manganese, and molybdenum mineralization. Sedimentary deposits of clay, coal, perlite, pumice, and pumicite are in the Ricardo formation, and uranium mineralization is associated with some strata in this formation. Placer gold is sparsely distributed in basal members of the Goler and Ricardo formations, but the Quaternary gravels are richer.

The placer gold deposits were discovered about 1893 and hundreds of prospectors obtained small amounts of gold by "dry washing" the gravels, mostly during the 1890s and a several-year period in the 1930s. Most of the clay was mined between 1920 and 1940 and was used principally as an adsorbent in refining petroleum products. Pumice and pumicite, mined nearly continuously since the 1920s, have been used in cleansing compounds and filler material. In 1958, the pumice deposit mined by Calsilco Corp. was the only active mine in the area.

The principal placer gold areas are, from east to west: Goler Canyon and Reed and Benson Gulches on the west side of Goler Canyon; the segment of Last Chance Canyon between Holloway Camp and the mouth of Bonanza Gulch; Bonanza Gulch; and tributary canyons on the east side of Redrock Canyon. The placer gold generally is most abundant in the lowermost part of Quaternary gravels on the sides of the stream beds or gulches. These gravels, or fanglomerate, contribute gold to smaller, but commonly rich, concentrations of placer gold accumulated in gullies downslope from the gravels.

Copper, gold, lead, manganese, and molybdenum mineralization is associated mostly with quartz veins in metasedimentary rocks and igneous rocks. Copper deposits are the most abundant of these and commonly contain traces of gold and silver. Lead is found in only a few prospects, and manganese was noted only in traces in some of the quartz veins. Molybdenum is present as powellite pseudomorphs after molybdenite and as molybdenite disseminated in dikes. Fragments of the powellite pseudomorphs have been collected for many years from gravels in upper Last Chance Canyon and are prized as mineral specimens.

The clay and pumice deposits in the lower part of the Ricardo formation are in a northeast-trending belt extending between Redrock and Black Mountain (fig. 8). In the southern part of the belt a layer of altered pumice and pumicite was the source of a few tens of thousands of tons of adsorbent clay obtained mostly from the Snow White mine. This same sedimentary layer, some 7 miles to the northeast, is the source of high-grade pumice which is marketed by Calsilco Corporation for several uses. A layer of very pure pumicite which occupies a stratigraphic position a few hundred feet higher in the Ricardo formation than the pumice layer was mined for nearly 25 years by Cudahy Packing Co. for use in a household cleaner.

Erskine Creek District

Erskine Creek, a northwest-flowing tributary to the Kern River, cuts through a north-trending roof pendant of pre-Cretaceous metasedimentary rocks that contains deposits of tungsten, gold, silver, antimony, uranium, copper, and building stone. These deposits lie within an area about 5 miles long and about 2 miles wide. Center of the area is about 5 miles southeast of Bodfish. Figure 9 shows mines and prospects in the Erskine Creek district, as well as gold deposits and one tungsten deposit in the northwest part of the Piute Mountains.

Antimony and gold deposits were productive in the early 1890s and later, though production was probably not large. Copper was discovered before 1904 but as late as 1958 the prospects remained unproductive. Tungsten was produced in the 1940s and 1950s, and probably has the highest total dollar value of materials mined in the district. Uranium mineralization was discovered in 1954, but only several tens of feet of underground workings were driven. Fine-grained metasedimentary rocks are mined intermittently from a deposit on Cook Peak and marketed as building stone. A travertine deposit at the mouth of Erskine Creek has been prospected for stone but none had been produced by 1959.

Gold, associated with unidentified silver minerals, has been mined mostly from the Iconoclast mine from quartz veins in a northeast-trending zone that is nearly vertical.

The principal source of tungsten in the district is a deposit of scheelite in metamorphic rocks at the Unip mine. Scheelite is also in the tactite at the Christmas Tree prospect.

Antimony is found in a quartz vein at the Tom Moore mine in fine-grained metasedimentary rocks. The principal minerals are stibnite, native antimony, and several oxides of antimony.

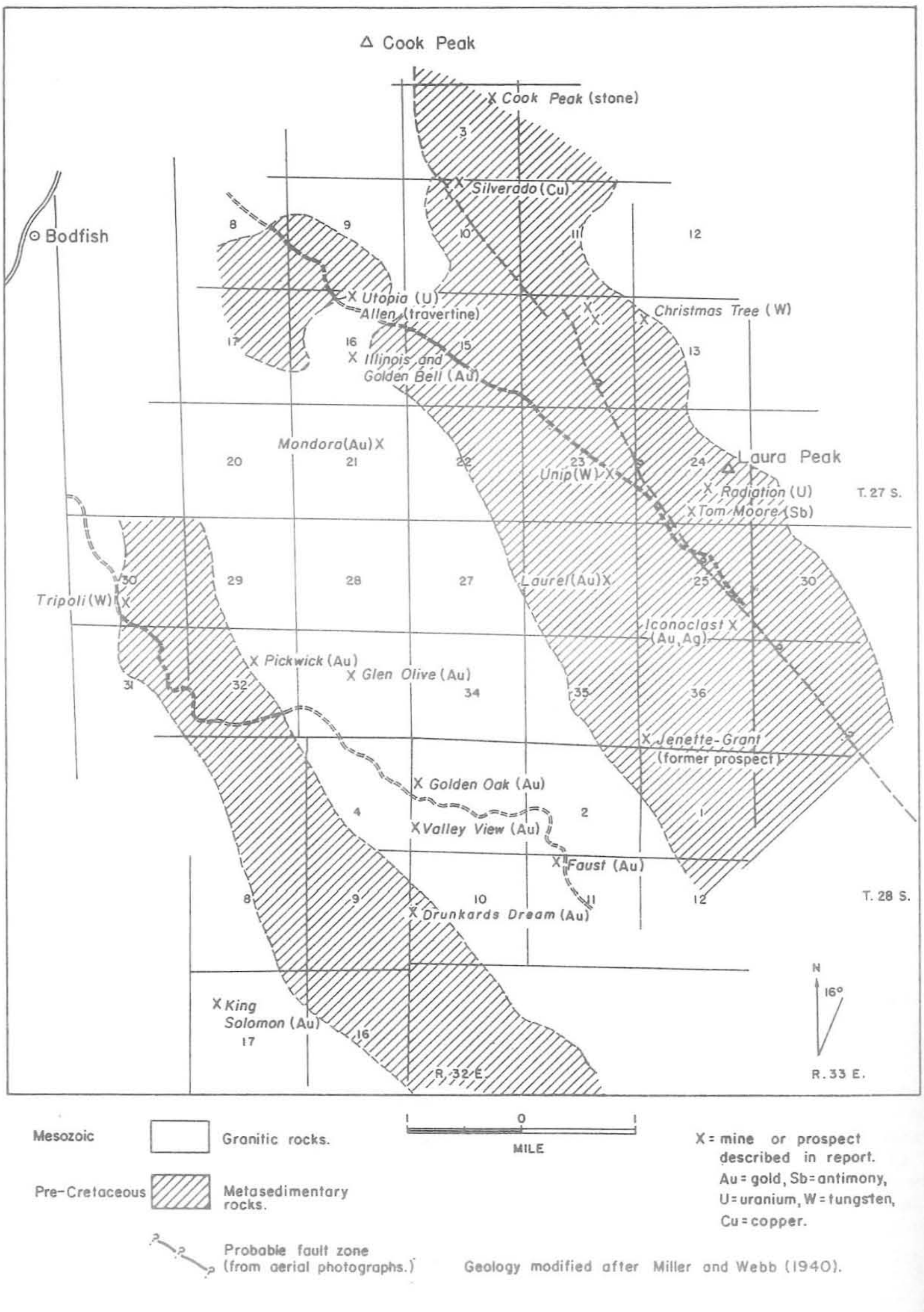


Figure 9. Geology, mines, and prospects in the Erskine Creek district and part of the northwestern Piute Mountains.

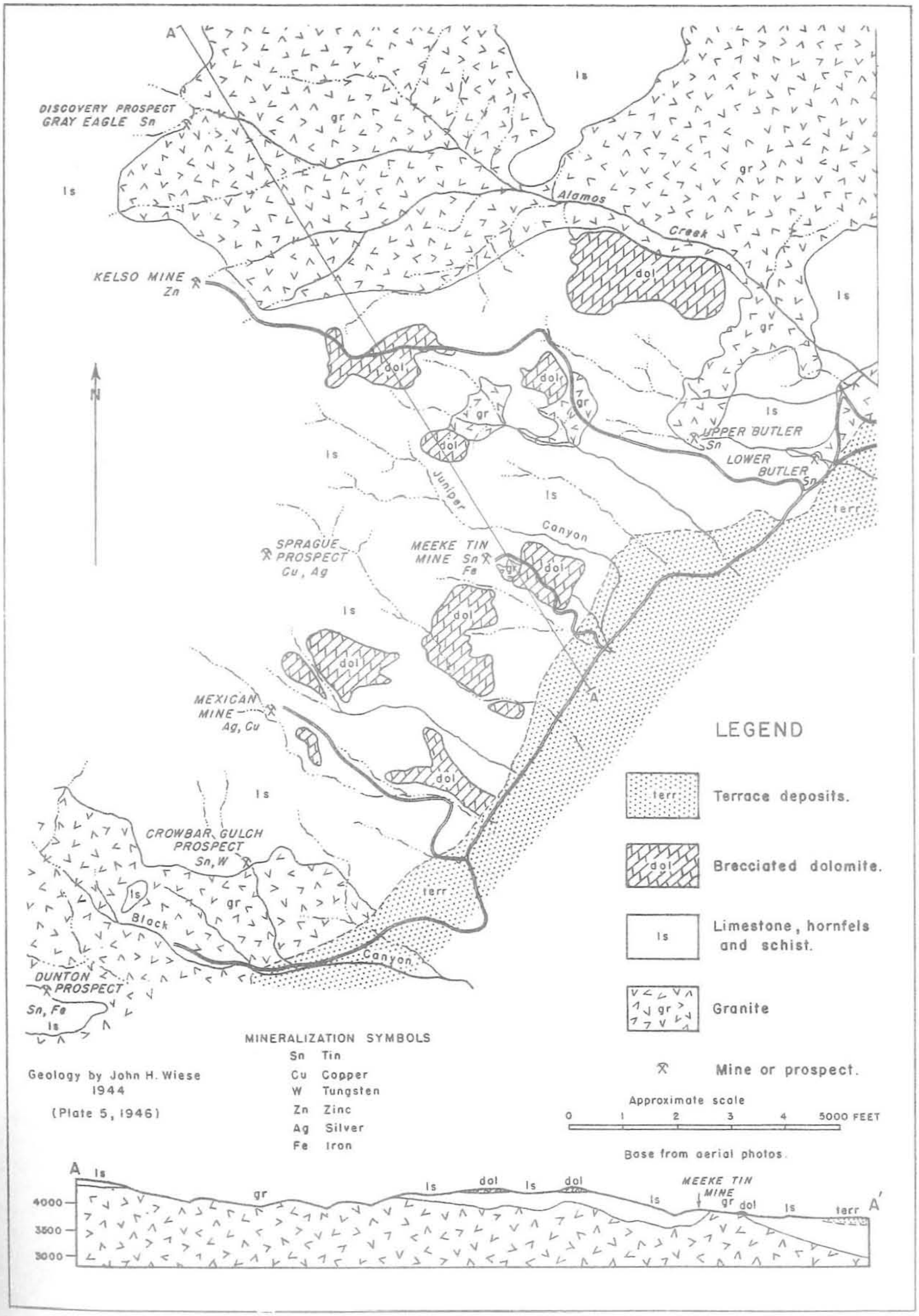


Figure 10. Geologic map and section of the Gorman tin district.

The principal uranium prospect is the Radiation property. Although pitchblende and gummite were tentatively identified in quartzite, no ore bodies were found and exploration was discontinued.

The Silverado copper prospect contains chalcopyrite with traces of gold and silver in a northwest-striking, vertical shear zone. Green copper oxides mark the trace of the shear zone for about 1,000 feet.

Pale-colored fine-grained metamorphic rock on the east slope of Cook Peak has been quarried intermittently in recent years for building stone.

Gorman Tin District

The Gorman tin district (fig. 10) includes an area of about 10 square miles on the southeast side of the Tehachapi Mountains and 6 miles northeast of the settlement of Gorman. Only tin and zinc have been mined from the district. Limestone, of possible commercial interest, crops out over most of the district; iron, scheelite, and molybdenite are associated with the tin deposits.

Although only the Meeke mine has yielded tin ore, five other tin deposits have been explored in the district since tin was discovered in 1940. The principal tin mineral is cassiterite, which is mostly in iron-rich tactite and gossan in limestone at or near contacts between limestone and granite. It also is found in limestone adjacent to tactite and gossan. Ludwigite, a magnesium and iron borate, may contain some of the tin in the tactite bodies, but is not an ore mineral of tin (Wiese and Page, 1946, p. 50).

Iron, in the form of hydrous and non-hydrous oxides (hematite, magnetite, and limonite), is the principal constituent of gossan and of the tactite bodies, but the deposits appear to be too small to be mined as bulk iron ore.

Zinc has been mined from deposits along fractures in limestone at the Kelso mine near the headwaters of Alamos Creek. It has also been detected by assay in tin ore from the Meeke mine.

The limestone and associated dolomite—a flat-bottomed pendant in granite, probably a few hundred feet in average thickness—are in most places white to pale blue and range from coarse to fine crystalline; these rocks have not been systematically sampled, to the writers' knowledge.

Greenhorn Mountain District

The Greenhorn Mountain district (fig. 11) comprises about 20 square miles of the Sierra Nevada approximately 28 miles northeast of Bakersfield and 4 miles northwest of Miracle Hot Springs. Its approximate boundaries are the Kern River on the south, Fremont Creek on the west, Woodward Peak on the north, and Black Gulch on the east. The first gold discovery in Kern County was made in Greenhorn Creek in 1851, by a member of General John C. Fremont's exploration party. An influx of prospectors followed, the town of Petersburg was established near Fremont Creek, and the district was extensively developed. After a disappointing recovery of placer gold, however, interest declined, and by 1900 Petersburg had become a ghost town. Subsequent intermittent and small-scale attempts to mine gold from lode and placer deposits have been mostly unsuccessful. As most of the mining in this district was done prior to 1890, no accurate production statistics are available.

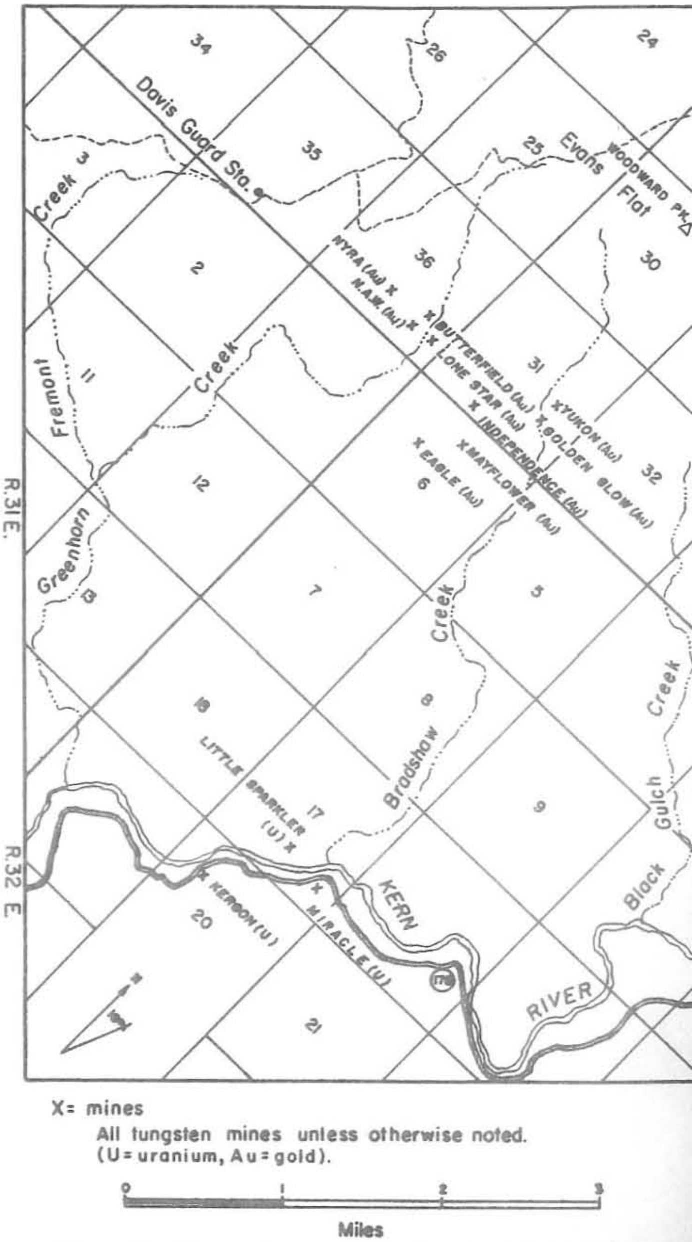


Figure 11. Mines and prospects in the Greenhorn Mountain district.

Mesozoic igneous rocks, largely quartz diorite, underlie most of the area, although small roof pendants of pre-Cretaceous metasedimentary rocks and elongate north-trending pegmatite dikes crop out at scattered localities.

Only lode and placer gold have been mined in the Greenhorn Mountain district, although an unusual uraniferous peat bog deposit was discovered in 1955 in the extreme northwestern part of the area. The lode gold deposits are in northeast-striking fissure veins which

range in width from a few inches to several feet. The veins strike N. 35°-75° E. and dip steeply northwest or southeast. They consist typically of iron-stained fault gouge and minor amounts of quartz. Free gold is the only ore mineral. Wall rocks generally consist of decomposed quartz diorite, but in a few mines one wall is composed of pegmatite.

Most of the veins are within a 4-square-mile area, the center of which is the 2 miles due east of David Guard Station. The veins are quite numerous and widespread but generally are weakly mineralized, narrow, and discontinuous. These features are reflected by the many shallow prospect holes and in the low productivity of the district.

Placer deposits derived from a large volume of bedrock probably were the source of most of the gold mined in the district. The discovery of a few rich placers apparently provided impetus to mostly unsuccessful attempts to find equally rich vein deposits from which the gold was derived.

The uraniferous peat bog deposit is on the old Pettit Ranch at the head of Little Poso Creek. Unidentified uraniferous material is still being deposited from uranium-bearing spring water into a bog consisting of woody fragments, black carbonaceous matter, silt, and decomposed granitic fragments. No mining of the material had been attempted by the end of 1958 (see text under *Uranium*).

Greenhorn Summit Tungsten District

The Greenhorn Summit area (fig. 12) comprises about 20 square miles centered approximately 35 miles northeast of Bakersfield and 7 miles east of Glennville. It includes most of the west half and southeast quarter of T. 25 S., R. 32 E., M.D.M.

Tungsten was discovered in this area in 1916 under the favorable marketing conditions of World War I. By 1922 most of the deposits known in 1958 had been located, but production from them had been only moderate. Peak intervals of development were during the periods 1916-18, 1923-28, 1937-45, and 1951-57. Production was greatest during the latest period owing largely to the stockpiling program of the Federal General Service Administration which was terminated in 1957. All mines in the district were idle during most of 1957 and 1958 because of the termination of the government purchase and a prevailing market price of approximately one-third that of the government price.

The area is underlain by Mesozoic plutonic igneous rocks and pre-Cretaceous metasedimentary rocks. The metasedimentary rocks consist of schist, hornfels, lime-

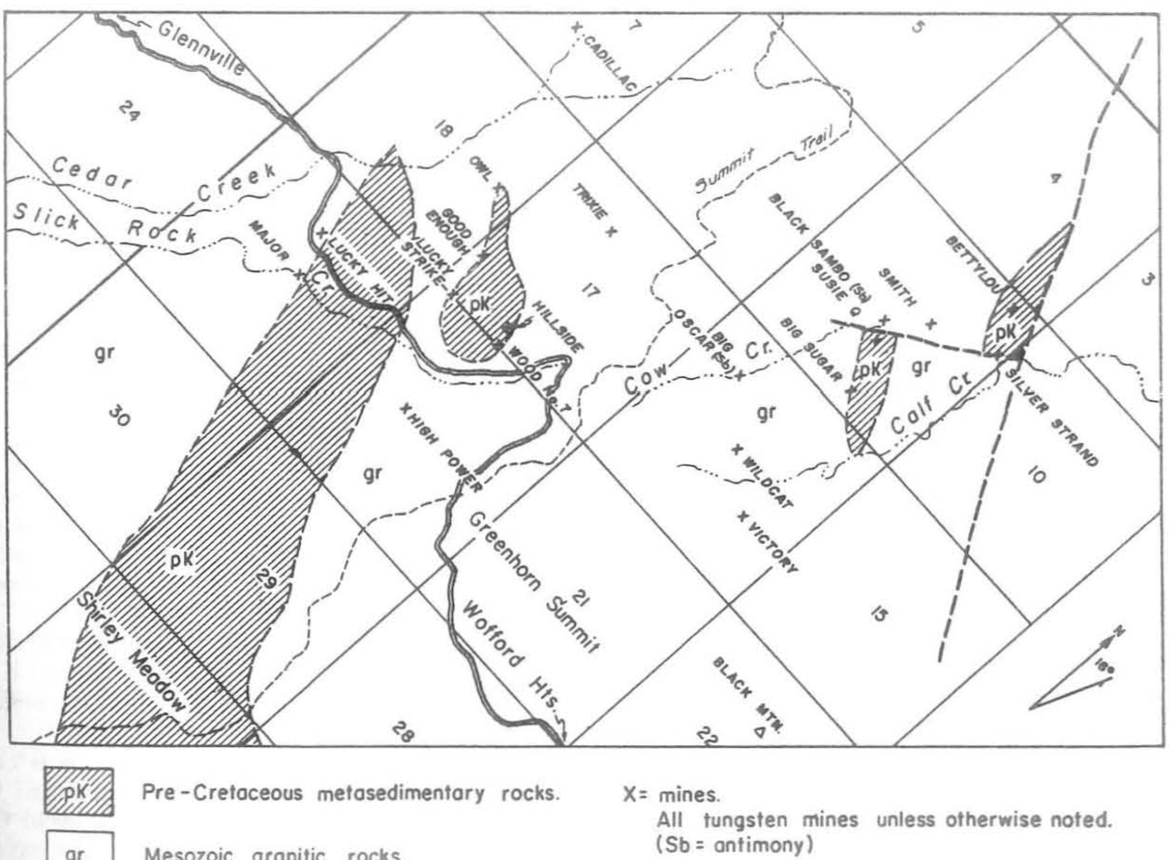


Figure 12. Geology and mines in the Greenhorn Summit tungsten area.

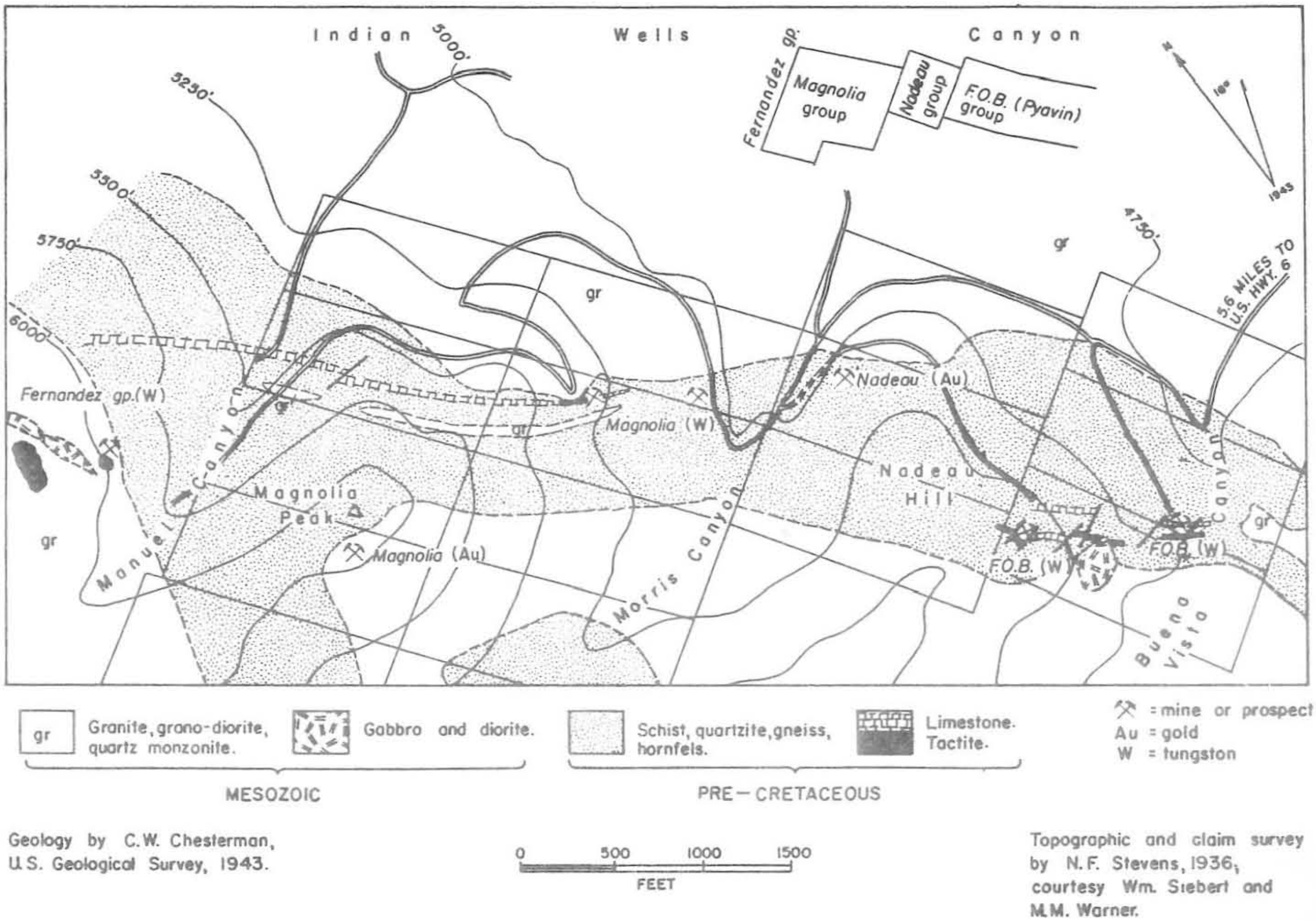


Figure 13. Geology and mines of part of the southwest side of Indian Wells Canyon.

stone, and quartzite and form northwest-trending roof pendants. The enclosing igneous rocks range in composition from quartz diorite (dominant) to gabbro. The largest pendant has a maximum width of 1 mile on Shirley Meadow road and extends from the vicinity of Cooks Peak to the head of Cedar Creek—a distance of 4 miles. Smaller but more strongly mineralized roof pendants crop out to the northeast and east of the main pendant (fig. 12).

The tungsten deposits are of the contact-metamorphic type (Hess and Larsen, 1921; Kerr, 1946) and consist of lenticular masses of tactite along the contact between granitic rocks and the roof pendants. The tactite bodies vary greatly in size, but most of them are less than 15 feet wide and less than 50 feet long. They are irregularly disposed and apparently have replaced limestone more commonly than other metasedimentary rocks. The tactite is composed principally of coarse-grained garnet, epidote, clinozoisite, calcite, diopside, and quartz, with scattered pyrite, chalcopyrite, pyrrhotite, and molybdenite. A narrow transition zone characterized by the presence of tremolite or wollastonite is found between the tactite and limestone in most of the bodies. Weathered outcrops of tactite are quite porous and friable and are readily identified by the characteristic assemblages of brown garnet and green epidote and by the dark soil which overlies some of them.

The mines of the district are grouped into two principal areas. One group is centered between the headwaters of Cedar Creek and Slick Rock Creek directly northwest of Cedar Creek Campgrounds. Of this group the Owl, Major, and Hillside mines have been the more productive. Others in the group include the Cadillac, Good Enough, Lucky Hit, Lucky Strike, Trixie, and Wood No. 7 mines. Complete production statistics are not available, but this group has produced a minimum of about 10,000 tons of ore which, in general, averaged from 0.5 to 1.0 percent WO_3

The second and less productive group is centered to the northeast of the first group between Calf Creek and Cow Creek, about 2 miles north-northeast of Greenhorn Summit. Here, the more productive mines have been the Big Sugar and Susie Q; the others are the Betty Lou, Silver Strand, Smith, Victory, and Wildcat mines.

Scattered elsewhere in the Greenhorn tungsten area are the Black Mountain King, Little Acorn, and Pala mines.

Most of the tungsten deposits in the Greenhorn tungsten area have not been extensively explored and developed. Only the immediately apparent near-surface ore bodies have been mined. A careful study of existing mines and a well-outlined diamond drilling program would probably prove additional ore bodies.

Antimony is present near the tungsten mines in the Calf Creek area, but has not been mined successfully. Stibnite is found in quartz veins and as a replacement of gougy material along shear zones in quartz diorite.

Mineral collectors regard the Greenhorn tungsten area as a source of smoky quartz, epidote, scheelite, and garnet crystals.

Indian Wells Canyon District

Indian Wells Canyon is on the east side of the southern Sierra Nevada, northeastern Kern County. It is approximately parallel to and 4 miles north of Freeman Canyon, which is traversed by State Highway 178. Gold was found there before 1880, but has been mined subsequently only in small amounts, probably near the present Nadeau and Magnolia mines. Some of the gold ore, however, was fairly rich. Scheelite has been the principal mineral mined. A tungsten mill, which has lain idle for several years, was constructed (probably in the 1940s) on the northeast side of Indian Wells Canyon about 4 miles west from the point where U. S. Highway 6 crosses the mouth of the canyon. It was nearly intact in 1957. Parts of a gold mill have been installed at the Magnolia mine. A tungsten mill, now removed, was once at the Fernandez mine.

Mesozoic granitic rocks, mostly quartz monzonite but locally as basic as gabbro, underlie the canyon bottom and its northeast wall. Pre-Cretaceous metasedimentary rocks, composed mostly of schist interbedded with thin layers of limestone and quartzite, underlie much of the southwest side of the canyon (fig. 13) and are part of a roof pendant several miles long and about a mile in average width. The pendant underlies the prominent ridge between Freeman Canyon and Indian Wells Canyon. Layering within the pendant strikes northwest and dips 60° to 80° NE. Tabular masses of quartz monzonite, commonly parallel to the long axis of the pendant, are within the body of metamorphic rocks.

Scheelite is a minor constituent of the tactite, which is composed largely of clinozoisite and garnet. Most of the tactite is in discontinuous layers and lenses, from a few inches to several feet in length, in limestone. The scheelite content of the tactite ranges from a trace to about 1 percent, but small pods containing 5 percent or more have been mined.

Most of the mines are in a relatively narrow belt of metasedimentary rocks along the northeast side of the pendant (fig. 13). The most productive mine, the Hi-Peak, however, is about a mile north of the mouth of Indian Wells Canyon in an isolated pendant of metamorphic rocks only a few hundred feet long. In recent years unexplored deposits of scheelite-bearing tactite have been found in the southwest side of the main pendant.

Gold is in northwest-trending quartz veins in both the metamorphic rocks and the quartz monzonite, but is not abundant. The Nadeau and Magnolia mines, both within the scheelite-bearing belt in Indian Wells Canyon, are the principal gold mines.

Jawbone Canyon District

The lower part of Jawbone Canyon, an east-draining stream course in the southern Sierra Nevada, cuts through an area a few tens of miles in extent that contains a wide variety of mineral deposits. Antimony, clay, gold, roofing granules, stone, and tungsten have been produced from the district; but clay, roofing granules, and gold have accounted for most of the dollar value, which is estimated by the writers to be about $700,000. In addition, the area is noted for yielding well-developed feldspar and quartz crystals.

A west-dipping, north-striking succession of Tertiary sedimentary and volcanic rocks crops out in an area about 1½ miles wide and 4 miles long across Jawbone Canyon. These rocks lie on Mesozoic granitic rocks and are intruded by Tertiary rhyolite dikes and plugs. Pendants of metamorphic rocks, a maximum of a few tens of feet long, crop out in a few places. The geology of the area was mapped and described by H. S. Samsel (1951, 1962).

Clay has been mined from an altered rhyolite plug at the White Rock deposit on the north side of Chuckwalla Mountain. Large tonnages of clay remain in the mine area. A 10-foot layer of swelling bentonite (White Swan deposit) a few hundred feet in exposed length has been prospected but not mined. Tertiary? claystone consisting of layers that aggregate about 30 feet in thickness crop out on both sides of a narrow canyon for several hundred feet at the Red Hill deposit. A few thousand tons of it was mined. It has a pyrometric cone equivalent of about 19.

Stone for roofing granules has been mined mostly from pale-green welded rhyolite tuff breccia and other Tertiary rocks at a small hill called "Blue Point" on the north side of Jawbone Canyon. Granitic rocks south of the canyon also have been mined for roofing granules. Tertiary rhyolite dikes containing brown bands formed by iron oxides have been mined in small quantities for decorative stone at a few localities in the district.

The principal gold mines are the Skyline mine at the south edge of Antimony Flat and the San Antonio mine about 6 miles north of Blue Point. The other gold mines are very small. The gold is in quartz veins in granitic rocks; most of the veins trend west to northwest. Placer gold was recovered before 1900 from small deposits in dry stream channels, principally Water Canyon, near the mouth of Jawbone Canyon.

Scheelite in a small tactite body (High-Low mine) has been the source of tungsten valued at about $12,000, and

wolframite is found in fractured granitic rocks (Blue Point prospect). Cinnabar is present in veinlets in rhyolite on the south side of Jawbone Canyon and in metamorphic rocks at the Mammouth prospect on the south side of Chuckwalla Mountains. Uranium deposits have been prospected at the Silver Lady claims, Miller Ranch, and Beryl No. 4 claim, but they remained unproductive through 1958.

Granite porphyry in a dike near Water Canyon has been for many years a favored locality for collecting large phenocrysts of orthoclase and small crystals of quartz (Murdoch and Webb, 1942, p. 325).

Kern River Canyon District

The Kern River Canyon area discussed herein is a 20-mile-strip from 1 to 2 miles wide, extending from Bodfish southwestward along the Kern River to the west front of the Sierra Nevada, about 10 miles northeast of Bakersfield (fig. 11).

Placer gold and uranium deposits, mostly in the northeastern half of the area, have been mined, and lode gold as well as lode and placer tungsten deposits have been explored. Placer gold deposits were mined as early as 1851 in Greenhorn Creek (Gulch) near its confluence with the Kern River (Tucker and Sampson, 1933, p. 278). Although little is known of the area's early placer-mining activities, the deposits apparently were few and soon worked out. The most productive placer gold mine apparently was the Greenhorn Caves mine in Greenhorn Creek with a reported production valued at $60,000 (Tucker and Sampson, 1933, p. 307). No reliable estimates of total production from placer mines in the area is available. Of the numerous prospects for lode gold and tungsten, only the Gem mine was of any consequence. At the Gem mine, 1 mile southwest of Democrat Springs, reported production was valued at $30,000 (Tucker and Sampson 1933, p. 303).

The most recent mining interest in the Kern River Canyon area is in the uranium deposits, first noticed by Harry B. Mann in January 1954 (Bowes, 1957, p. 7). Through 1958, three deposits, the Kergon, Little Sparkler, and Miracle mines, have yielded a total of about 11 railroad cars of ore which averaged about 0.3 percent U_3O_8.

Almost the entire Kern River Canyon area is underlain by Mesozoic quartz diorite and associated aplitic and pegmatitic dikes, which most commonly trend north. Small pendants of pre-Cretaceous metasedimentary rocks are present in the granitic rocks. Moderate foliation is common in the granitic rocks, especially near contacts with the pendants.

The gold and tungsten placer deposits are in the recent gravels of the Kern River and its tributaries. The gold is probably derived from the Greenhorn Mountain, Keysville, Clear Creek, and the Cove districts, which lie within a 10-mile radius to the north and northeast. Most of the scheelite probably is derived from the Clear Creek district, although Erskine Creek and Kernville areas may have contributed substantial proportions. No placer tungsten has been shipped.

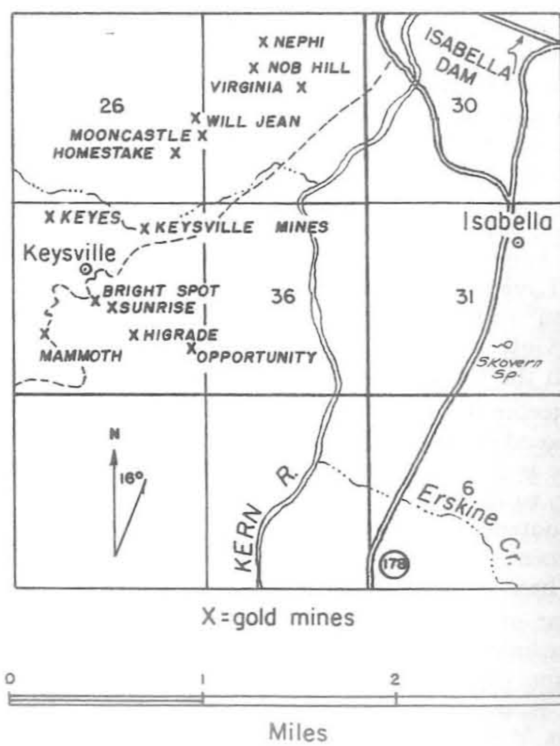
Uranium mineralization apparently is confined to a 1-square-mile area centered about 1½ miles west of Miracle Hot Springs. The uranium is found along fractures and shears which have no apparent favored orientation. Ore deposition was controlled by intersection of shears and fractures or by abrupt changes in the dip of the vein (Bowes, 1957, p. 5).

Keysville District

The Keysville district (fig. 14) is 32 miles northeast of Bakersfield and 2 miles southwest of Isabella Dam. It comprises about 15 square miles, bounded approximately by the Kern River, French Gulch, and Black Gulch.

Gold was first discovered in this district in 1852 by Richard M. Keyes (Tucker and Sampson, 1933, p. 278) who located a group of claims later known as the Keyes mine. This and the Mammoth mine, which was located soon thereafter, became the two most productive mines of the district. Subsequent discoveries at the sites of the Pennsylvania, Sunrise, and other mines led to the establishment of Keysville, the ascendant community of the Kern River country until the boom at Havilah in 1867. Keysville, which is 2 miles southwest of Isabella Dam on the west side of Kern River, has since become a ghost town. The principal periods of mining activity after the 1860s were during the 1890s, from 1909 to 1915, and for a brief time following the rise in the price of gold in 1933.

Figure 14. Mines and prospects in the Keysville district.



Mesozoic plutonic igneous rocks, predominantly quartz diorite, underlie virtually all of the area. The gold is in a vein system which strikes N. 40°-50° E. and dips 70°-80° SE., closely resembling in nature and attitude the vein system in the Clear Creek district 7 miles to the south. Both systems contain sub-parallel discontinuous quartz veins, and both apparently terminate at the Kern Canyon fault. The Keysville veins, unlike those at Clear Creek, contain little pyrite and arsenopyrite.

Most of the deposits lie in a mile-wide northeast-trending belt extending 3 miles southwest from Lake Isabella to a northwest-trending ridge overlooking Black Gulch. The veins range in width from 3 inches to 6 feet and each consists typically of a gouge-filled fault zone which contains narrow, discontinuous quartz stringers. Gold is in the free state, both in the gouge and in the quartz stringers. In some veins it is associated with sparsely distributed grains of pyrite, arsenopyrite, and pyrrhotite. Hydrous iron oxide stains are common.

Locally derived Recent placer deposits, which are mostly in shallow draws and intermittent streams, have been mined for gold since 1852. One mine, however—the Keyesville Placer—is in Pleistocene? auriferous stream gravels which are poorly sorted and occupy a southeast-draining channel about a mile southeast of Keysville. This channel lies above the present channels and has been dissected almost to bedrock. The gravel deposit is apparently 10 to 20 feet thick, less than 20 feet wide, and less than 2,000 feet long. Its known production is small.

Kramer Borate District

By William E. Ver Planck

The Kramer borate district lies in southeastern Kern County near the town of Boron, about 30 miles east of Mojave. Borates are obtained from a buried, nearly flat-lying tabular mass of borax ($Na_2B_4O_7.10H_2O$) and kernite ($Na_2B_4O_7.4H_2O$) estimated to be 1½ to 2 miles long, half a mile wide, and more than 200 feet in maximum thickness (Gale, 1946). The deposit contains only minor amounts of other saline minerals. Borax comprises probably more than half of the sodium borate body, but kernite forms large masses in the body. Both borax and kernite form anhedral crystalline masses; some are transparent, others are clouded by included sediments. A minor proportion of shale is present, in the sodium borate body, as interbedded seams or lenticular bodies as much as 2 inches thick, and in some areas the body is divided into three separate layers by shale with a relatively low content of borate minerals. Disseminated masses of colemanite and ulexite that are of no present economic value lie beneath an area 4 miles long and about a mile wide, surrounding the sodium borate body.

The borates that have been mined in the Kramer area are in a basin containing rocks of the Miocene? and Pliocene Tropico group (Dibblee, 1958). The Tropico group is divisible in the Kramer area into three parts—a lower part, the Saddleback basalt, and an upper part, which includes the borate-bearing beds. Borates are not known in the sediments below the Saddleback basalt. The sodium borates are preserved in a synclinal basin that has been modified by subsidiary folding and minor faulting and lie at depths of from 150 to 1,000 feet beneath the surface. The United States Borax & Chemical Company, Pacific Coast Borax Company Division, owns or controls all of the sodium borate body except for a comparatively small portion that is controlled by the owners of the Mudd mine.

Borates were discovered in the Kramer district in 1913. Dr. J. K. Suckow found colemanite in a well drilled for water in NW¼ sec. 22, T. 11 N., R. 8 W., S.B.M., 1½ miles west of the sodium borate body. The Pacific Coast Borax Company and affiliated organizations acquired most of the available property in the area and in the following years outlined the limits of the colemanite and ulexite deposits. In 1925 the Suckow Chemical Company produced a few hundred tons of colemanite from the Suckow No. 2 shaft or Suckow colemanite mine in NE¼ sec. 22. In a contemporary report, Gale (1926) described the deposit as lower in grade than the colemanite deposits then being worked at Ryan, Inyo County, and elsewhere. Early in 1925 W. M. Dowsing and John L. Hannam discovered the more important sodium borate body by drilling in NE¼ sec. 24, T. 11 N., R. 8 W., S.B.M. The Pacific Coast Borax Company purchased the property and immediately began the development of a mine called the Baker mine. Soon after development began, the new sodium borate mineral kernite (also called rasorite) was recognized (Schaller, 1927, p. 24-25). A shaft reached the deposit in August 1926, and production began in 1927.

At about the time the Baker mine was brought into production, the Suckow mine, now called the West Baker mine, and the Western mine, now called the Mudd mine, were developed by independent interests. The Suckow mine of the Suckow Borax Mines Consolidated, Ltd. in which Borax Consolidated, Ltd., the principal of Pacific Coast Borax Company, had a half interest as tenant in common, is in SE¼ sec. 14. Production began in 1927 but only a comparatively small tonnage had been mined when Borax Consolidated, Ltd. and Suckow Borax Mines Consolidated, Ltd. became involved in litigation which ultimately resulted in Borax Consolidated, Ltd. obtaining control of the Suckow mine. Renamed the West Baker mine, it was an important unit of the Pacific Coast Borax Company's operations from 1935 to 1951.

The Mudd (Western) mine is near the center of sec. 24. Kernite was found on this property in July 1927 by W. M. Balling and associates who had previously explored an area west of the calcium borates. Balling transferred his interests to the Western Borax Company, and production began in November 1928. In mid-1933, after a high proportion of the readily recoverable ore had been mined, the property was sold to Pacific Coast Borax Company interests. In 1948, as the result of action by the Federal Government, the Pacific Coast Borax Company sold the Western mine to Seeley G. Mudd, Henry

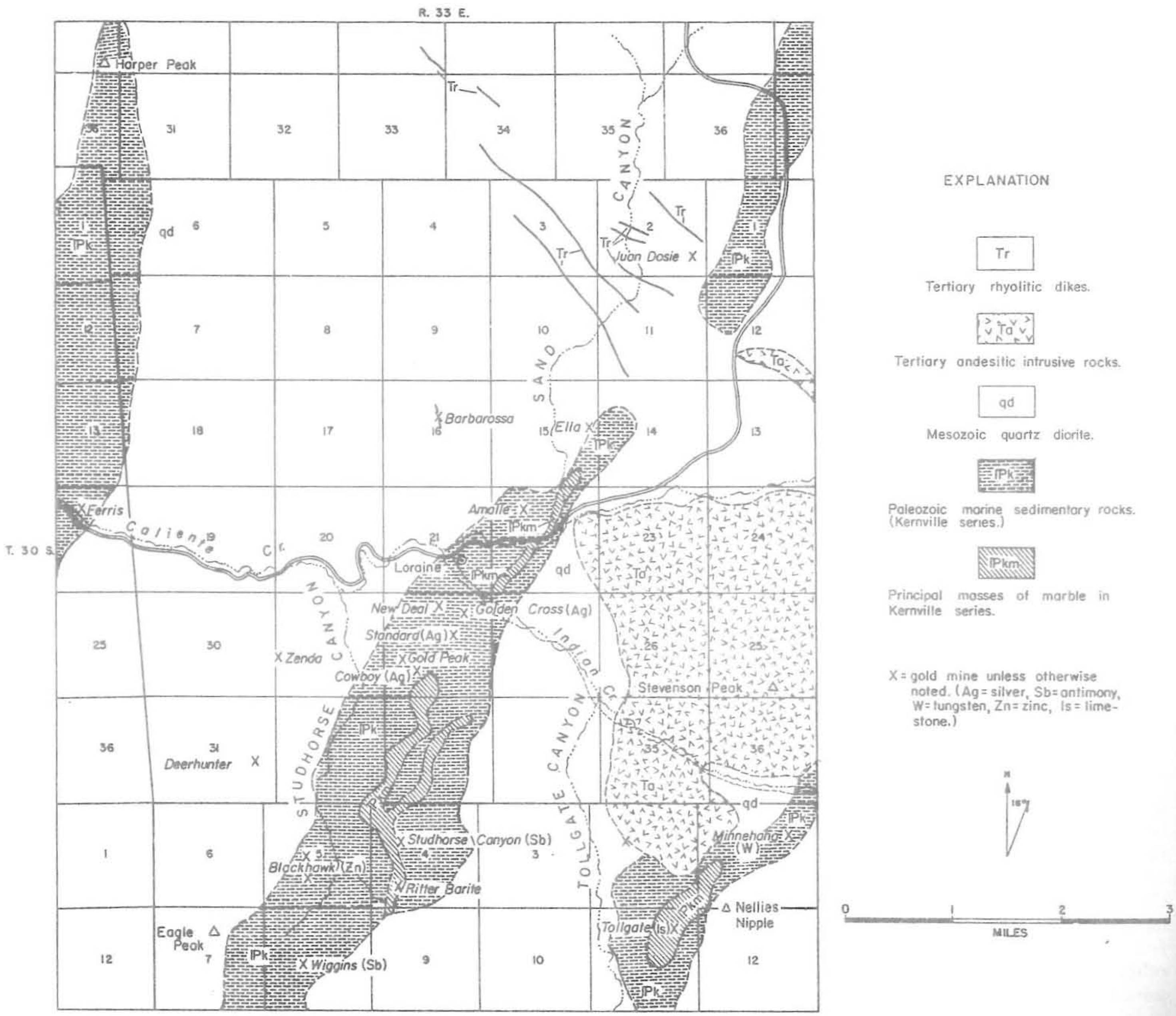


Figure 15. Geology, mines, and prospects in the Loraine district.

T. Mudd, Caryl M. Sprague, and George D. Dub. This group obtained a Federal lease on the Little Placer, an adjoining 10-acre portion of the sodium borate body, in 1954. They reopened the former Western mine in 1956.

The United States Geological Survey, as part of its study of the saline resources of southeastern California, has made investigations in the Kramer borate area (Dickey, 1957; Benda, Erd, and Smith, 1958). One phase of the work included preliminary gravity, seismic, and aeromagnetic surveys that indicated in an approximate way the configuration of the pre-Tertiary bedrock surface and the locations of additional basins containing Tertiary, possibly borate-bearing, sediments. Basins thus outlined were tested by five bore holes drilled from 1954 to 1957. All but one of the bore holes were in San Bernardino County about 5 miles east of Boron near Kramer Four Corners. Colemanite in amounts large enough to warrant prospecting by private organizations was found north of Kramer Four Corners. The hole in Kern County, known as Four Corners No. 2, was about 5 miles west of

Boron, south of the known sodium borate body. It was drilled to 2,328 feet but did not penetrate borate minerals or lake beds.

When mining began, methods similar to those used in metal mines of the period were adopted. Through the years, as the Pacific Coast Borax Company gained experience with the mining of massive sodium borates and as the production increased, mechanized mining methods were developed. Auger drills replaced hammer drills, and modified shrinkage stoping, using portable slushers, replaced open stoping and shrinkage stoping. In 1950 and 1951 the Pacific Coast Borax Company developed the Jenifer mine in NE¼ sec. 23. In the Jenifer mine continuous mining machines and belt haulage were employed. By 1955 an anticipated increase in the demand for boron minerals, the possibility of reducing waste in mining, obtaining safer working conditions, and developments in mining equipment made open-pit mining feasible. In January 1956 preliminary work began on an open pit, called the Boron mine, in NE¼ sec. 23. The open pit was dedicated on November 17, 1957; and the underground mines were dismantled.

Very little groundwater is present in the Kramer borate district, and the mines are dry. The sodium borate ore is non-toxic, non-corrosive, comparatively easy to drill, and strong enough to stand with minimum support. Upon exposure to air, freshly broken borax quickly undergoes a surface alteration to white, powdery tincalconite ($Na_2B_4O_7.5H_2O$); but the strength of the borax is not impaired. Kernite does not alter in this way. The alteration commonly observed on exposed kernite is thought to be due to small amounts of undetected borax (Muessig and Allen, 1957). The shale that encloses the ore is weak, and in underground mining some ore is left to protect it. Additional ore is left in pillars to prevent the subsidence of mined-out areas. Instances of pillar failure have occurred, allowing a small amount of water from near-surface gravels to enter the mining area, softening the shale, and resulting in the disruption of mining operations and the loss of ore. About 50 percent recovery is achieved in underground mining.

Loraine District

The Loraine district (fig. 15) is centered 12 miles north of Tehachapi in the extreme southern end of the Sierra Nevada. It embraces approximately 60 square miles and is bisected by the upper reaches of Caliente Creek in terrain of moderate to sharp relief. Most of the mines in the district are within a triangular area with apexes at Harpers Peak on the northwest, Eagle Peak on the southwest, and Stevenson Peak on the east.

Silver and gold valued at more than $600,000 has been yielded by the district since mining began in the 1890s. The tungsten, antimony, lead, zinc, and copper output has been valued at approximately $150,000. In 1959, a deposit of barite was being developed.

The district is underlain by Mesozoic biotite hornblende quartz diorite and by roof pendants of pre-Cretaceous metasedimentary rocks. The quartz diorite is medium gray, equigranular, medium grained, and, near contacts with roof pendants, is poorly to moderately foliated. The roof pendants are composed of layers of mica schist, quartzite, hornfels, and limestone. The largest roof pendant is a nearly continuous body, which in the Loraine district is 1 to 1½ miles wide and extends laterally several tens of miles from Tehachapi Creek on the south to Lake Isabella on the north. In the Loraine district the pendant trends north-northeast between Eagle Peak on the south to the old townsite of Piute.

Numerous Tertiary rhyolite porphyry dikes have intruded the granitic and metamorphic rock throughout the district. The dikes range in width from a few feet to many tens of feet and are as much as several hundred feet long. Most of these dikes crop out as resistant ridge-forming masses that weather to a pale buff-yellow color, which contrasts with the predominantly reddish-brown color of the metasedimentary rocks and the knobby rounded outcrops of the granitic rocks. A few Tertiary dikes of andesitic to dacitic composition are found mostly in the northeastern part of the district. Both types of dikes trend northwest to west-northwest.

Silver and gold are present in quartz veins commonly within or along the walls of the rhyolite dikes. This relationship suggests that the mineralizing solutions may have been a late phase of the intrusion of the dikes. Premineral shearing, faulting, and sheeting provided channelways for the emplacement of the veins. The veins also commonly extend from the rhyolite into schist or diorite, or lie wholly within them, as at the Ella and Atlas mines. At the Barbarossa mine, a quartz vein strikes diagonally across a rhyolite porphyry dike to the edge of the dike, follows the contact for a few tens of feet, then swings into the quartz diorite where it splits or "horsetails" into minor fractures within a few feet. No known mineralization is associated with the dacite or andesite dikes.

Wall-rock alteration is pronounced in most of the silver and gold mines in the district. Kaolinization commonly extends a few tens of feet into both walls of the vein and alteration has been so intense that, in some mines, the nature of original wall rock is obscure. The altered rock is very weak and workings in it are held open only with difficulty, especially when it is wet.

The veins consist principally of white to blue-gray quartz containing pyrite, cerargyrite, bromyrite, argentite, and free gold. Tetrahedrite and proustite also have been noted. Hydrous iron oxides and melanterite are common in oxidized zones near the surface. At the Minnehaha mine large crystals of scheelite associated with free gold are in a vein in schist and limestone.

Zinc, lead, and copper have been mined at one locality in the district, the Blackhawk mine. There, aurichalcite, sphalerite, goslarite, hemimorphite, galena, cerussite, chalcopyrite, and malachite are in a gangue of calcite and quartz, with associated pyrite, arsenopyrite, and pyrrhotite. The deposit consists of irregular replacement masses along a contact zone between metamorphic rocks and quartz diorite.

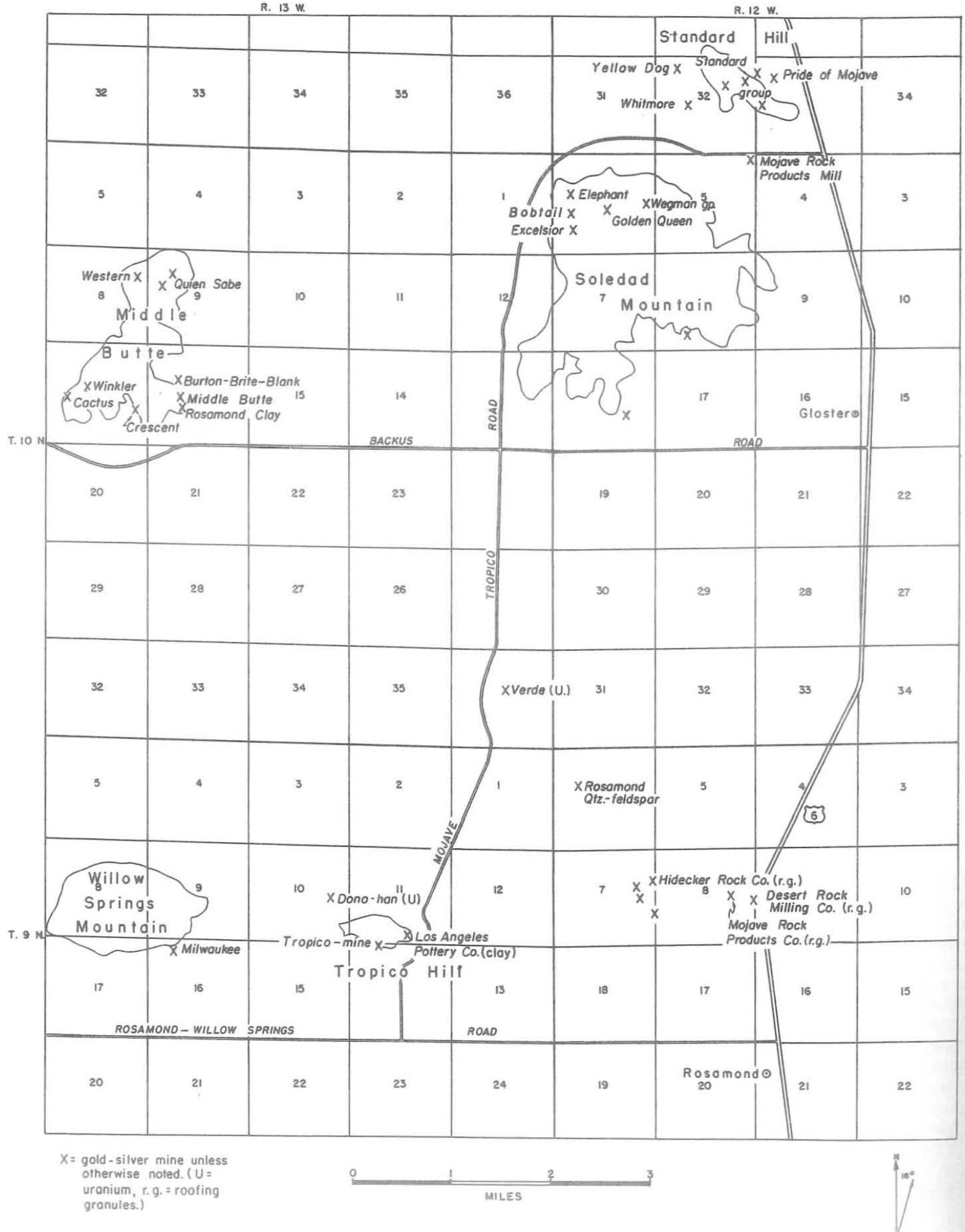


Figure 16. Mines and prospects in the Mojave district.

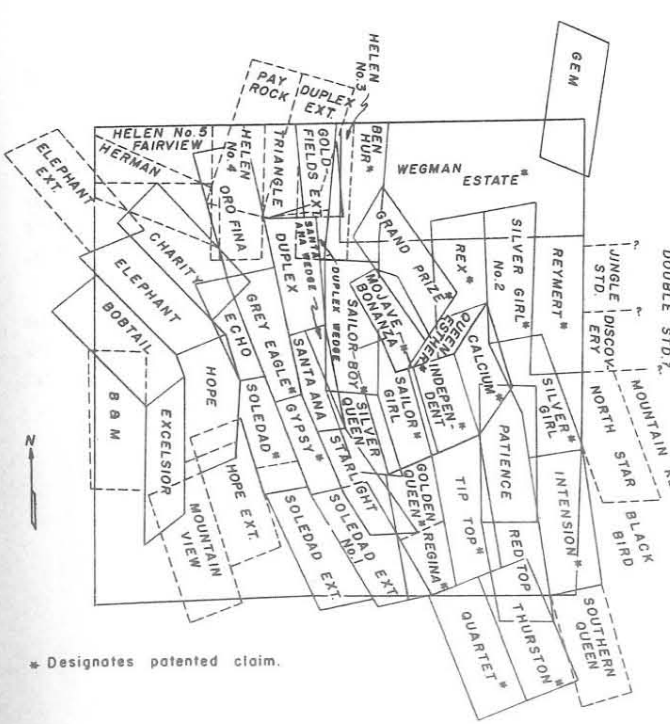


Figure 17. Claim map of north Soledad Mountain (Sec. 6, T. 10 N., R. 12 W., S.B.M.) Mojave district.

Several high-grade, closely spaced, and steeply dipping barite veins crop out in limestone on a sharp, high ridge between Studhorse and Hog Canyons on Ritter Ranch.

Two antimony prospects, the Wiggins and Studhorse Canyon deposits, have each yielded a few tons of ore. Stibnite and yellow antimony oxides are in steeply dipping, narrow fissure veins in highly bleached and altered granitic rock.

Mojave District

The Mojave district (figs. 16, 17, 18, 19) in southeastern Kern County comprises 70 square miles centered about 8 miles southwest of the town of Mojave. Five prominences separated by alluviated areas contain all the mines of the district, but comprise only a small proportion of the total area. Of these prominences Soledad Mountain, 5 miles south of Mojave, is the most important both in productivity and in the number of deposits. Tropico Hill and Middle Butte, 6 miles south and 4 miles west respectively from Soledad Mountain, are next in overall importance. Willow Springs Mountain, 6 miles southwest of Soledad Mountain, and the western part of the Rosamond Hills—which are between Tropico Hill and Soledad Mountain—are less well endowed with known mineral wealth. The Mojave district has yielded principally gold and silver, but feldspar, silica, clay, and volcanic rock also have been mined, and uranium, copper, lead, and antimony are known to be present.

Attention was first drawn to this district in 1894 when George Bowers discovered rich float on Standard Hill at the present site of the Yellow Rover mine. From high-grade ore collected from the surface, Bowers quickly shipped two rail carloads. Inspired by this success, other prospectors explored the surrounding areas and also discovered gold at what are now the Queen Esther, Echo, and Elephant mines on northern Soledad Mountain and at the Tropico mine on Tropico Hill.

A 20-stamp mill and cyanidation plant was constructed on Standard Hill at the Exposed Treasure mine in 1901. Water for the mill was obtained through a 14-mile pipeline from Oak Creek in the Tehachapi Mountains to the northwest. Three other mills were constructed at mines on Soledad Mountain in 1902, 1903, 1904, and the district flourished until 1914, when most of the mines were shut down.

With the onset of the depression in 1929 gold-mining activity increased, and by 1935 the district was experiencing its most productive era. During that year the Golden Queen Mining Co. was formed; and soon afterward the Lodestar Mining Co., Soledad-Mojave Mining Syndicate, Cactus Mines Co., and Standard Gold Mines Co. also were formed (Julihn and Horton, 1937, p. 4-5). From 1932 through 1942 the mines operated by these companies yielded gold and subordinate amounts of silver valued at more than $12,000,000. During the war years

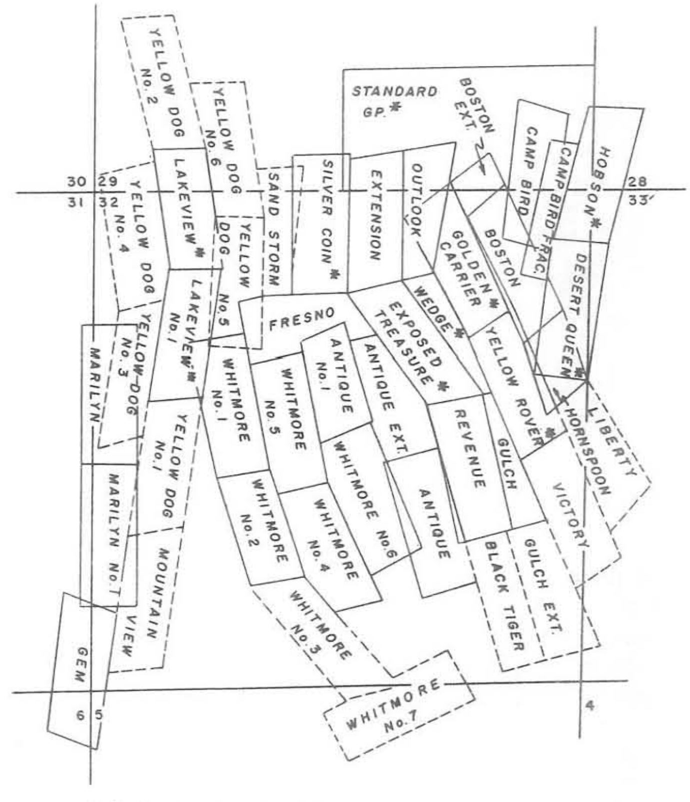


Figure 18. Claim map of Standard Hill area (Sec. 32, T. 11 N., R. 12 W., S.B.M.) Mojave district.

1942-45 all the mines were idle; between 1945 and 1958 production was probably less than one-tenth that of the boom period.

The oldest rock in the district is a medium-grained quartz monzonite of Mesozoic age. It is exposed in the low areas peripheral to resistant masses of younger intrusive rock and in parts of the northwestern Rosamond Hills. Intrusive into the quartz monzonite are small pegmatite and aplite dikes also of Mesozoic age. Overlying the Mesozoic rocks are Mio-Pliocene nonmarine sedimentary and pyroclastic rocks of the Tropico group (Dibblee, 1958, p. 136) which, in the Rosamond Hills, are homoclinal in structure and strike west-northwest, and dip moderately south-southwest (Roberts, 1951). These rocks also crop out in parts of the other prominences in the area. Later Tertiary rhyolitic volcanic rocks have been intruded into both the quartz monzonite and the Tropico group. These volcanic rocks are resistant and are the most abundant rock exposed in the mountainous and hilly portions of the district except in the Rosamond Hills.

The gold-silver deposits of the Mojave district are in epithermal fissure veins that occupy faults and shear zones. In general, the veins are confined to the rhyolitic volcanic rocks, although some of them have been traced downward into quartz monzonite. The principal ore minerals are cerargyrite, argentite, and free gold, but pyrargyrite, proustite, tetrahedrite, stromeyerite, native silver, and electum also have been found (Schmitt, 1940, unpublished report). The most common gangue minerals are quartz, pyrite, arsenopyrite, and hydrous iron oxides. Locally abundant in some deposits are chalcopyrite, galena, and stibnite. At Middle Butte the most common gangue is a kaolinite-alunite-quartz mixture.

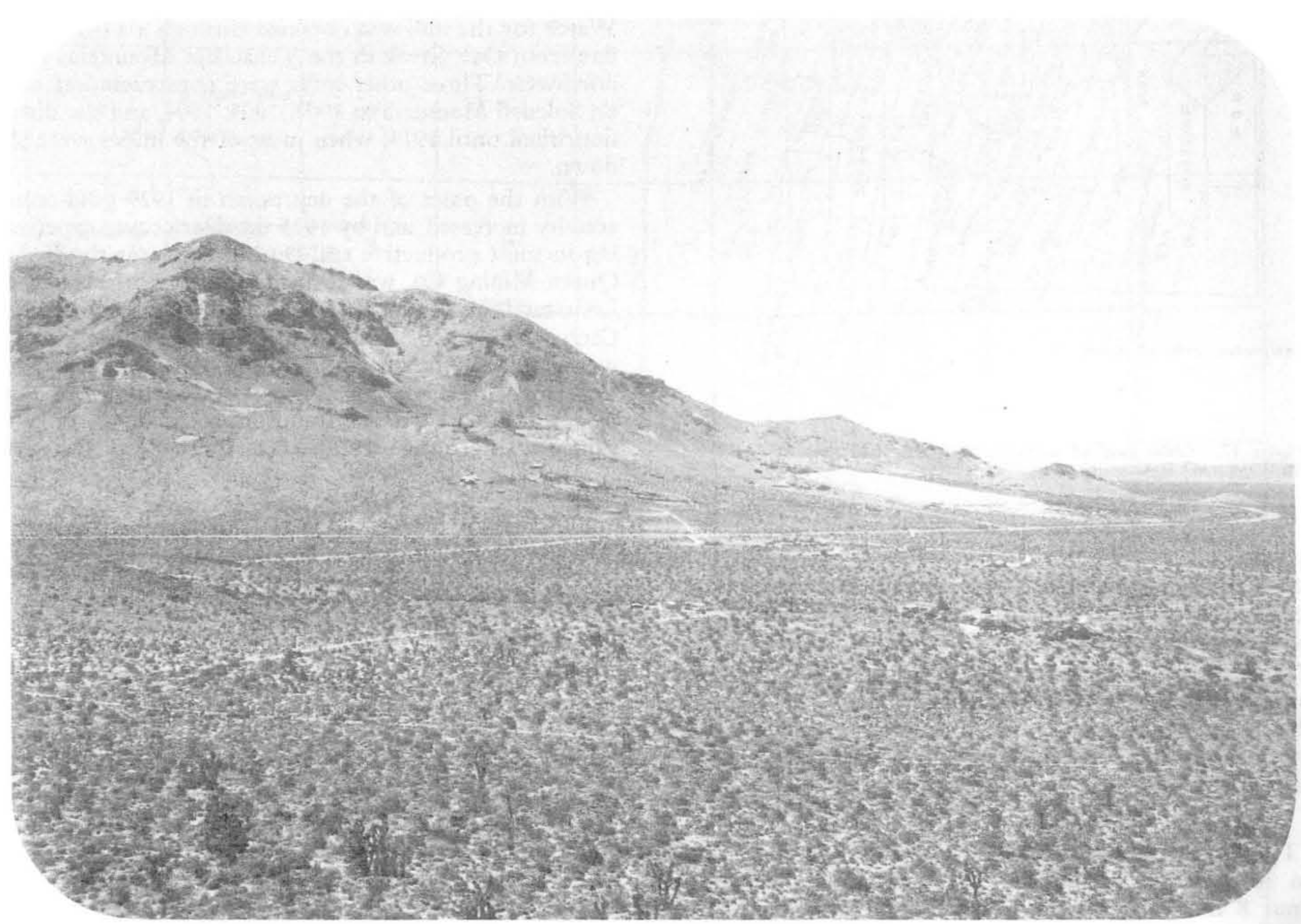


Figure 19. View to the southwest of the north slope of Soledad Mountain, Mojave district.

Quartz and feldspar are mined periodically from a pegmatite dike in the Rosamond Hills and are used as exposed aggregate and in ceramics. Pink, yellow, green, and lavender volcanic rocks in the Rosamond Hills are mined, crushed, and bagged for use as roofing granules. Clay suitable for use in manufacture of pottery has been mined from the northeast flanks of Tropico Hill. Small

amounts of weathered volcanic rock are collected from the east side of Middle Butte and sold as field stone.

Two uranium localities in the district have been explored: the Rosamond prospect and other nearby sources in an area 3 miles northeast of Tropico Hill were explored in 1955-56; and the Dono-han mine, half a mile northwest of Tropico Hill, was still under development in 1959. Both properties remained prospects in early 1959.

Piute Mountains District

The Piute Mountains district, an area of about 35 square miles, contains about 40 mines and prospects (fig. 20). The district is in the crestal part of the Piute Mountains and centers about the townsite of Claraville, about 14 miles southeast of Bodfish. Gold and tungsten have been the principal mineral products; antimony was produced from one deposit; and large bodies of white to gray carbonate rock have been prospected.

The most productive mines in the district have been the Bright Star, which was discovered about 1870, and yielded gold valued at about $600,000 (Brown, 1916, p. 490) and the Gwynne, which yielded about $770,000 in gold (Tucker, Sampson, and Oakeshott, 1949, p. 244). Each of the two has yielded several times more gold than the combined total of the other gold mines in the district. The principal periods of gold mining were 1870 to 1900, and the 1930s to the 1940s. An undetermined but small tonnage of tungsten has been produced—probably from

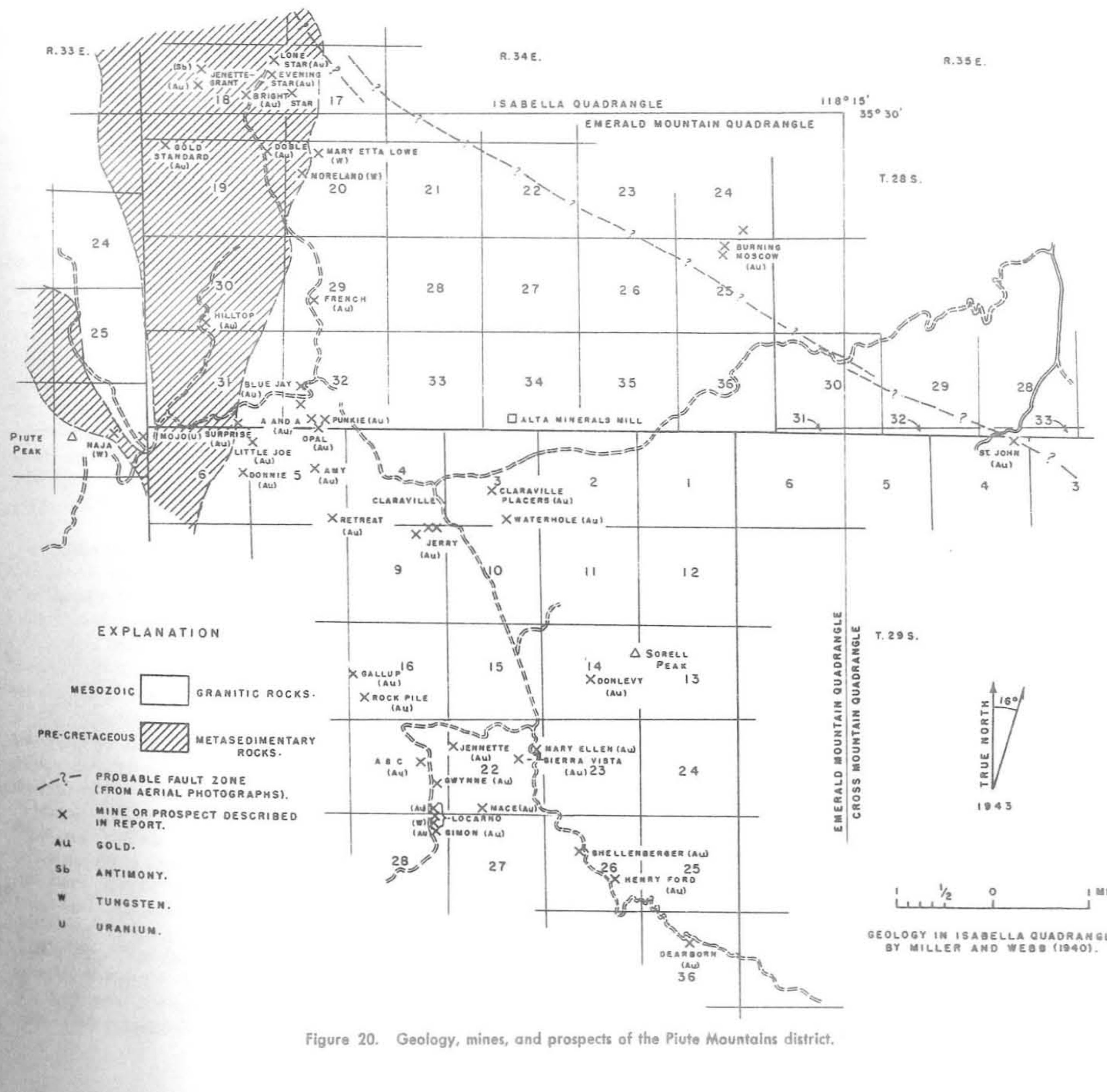


Figure 20. Geology, mines, and prospects of the Piute Mountains district.

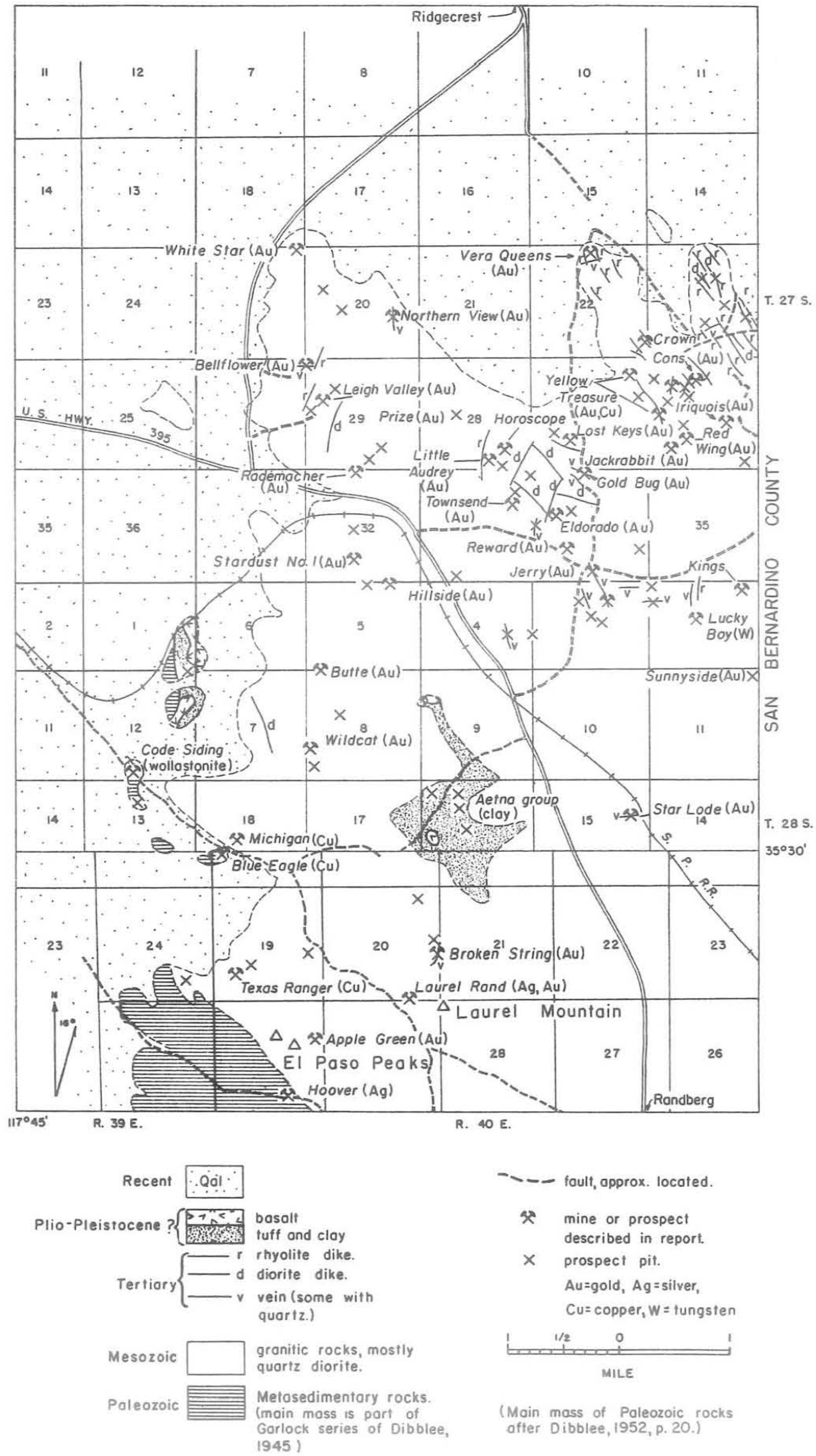


Figure 21. Geology, mines, and prospects of the Rademacher district.

three mines—since about 1950, and antimony valued at $13,000 was mined from the Jenette-Grant mine in 1918 (Goodwin, 1957, p. 529).

Most of the district is underlain by Mesozoic granitic rocks which contain a pendant of pre-Cretaceous metasedimentary rock. The pendant is from half a mile to 2 miles wide and is several miles long.

The gold deposits are in a belt about 2 miles wide that trends northwest in the granitic rocks, and north-northwest in the metamorphic rocks. Most of the gold deposits are in quartz veins which occupy shear zones and closely spaced joints, and trend mostly northeast. In most mines the gold is free-milling. Sulfide mineralization is evident in the deeper parts of some of the mines. According to U. S. Bureau of Mines production records, ore from most of the mines contained from 1/6 oz. to 1½ oz. of gold per ton, which accompanied silver at a ratio of about 2:1. About ½ oz. of gold per ton is probably the approximate average for all mines.

The tungsten deposits are of two types: scheelite in gold-bearing quartz veins, and scheelite in tactite bodies near limestone. Most of the tungsten deposits explored by mid-1959 yielded pods of ore rarely more than a few feet in maximum dimension.

Antimony was mined along a north-trending contact between limestone and phyllite at the Jenette-Grant mine. The principal mineral was stibnite.

Carbonate rocks, in masses as much as several hundred feet long, several tens of feet wide, and several tens of feet in exposed vertical extent are found in the roof pendant of metasedimentary rocks. A few small open cuts have been made in the whitest portions of some of the bodies along the east side of the pendant. Rocks exposed in these cuts are white enough to be utilized as roofing-granule material, and some might be suitable for filler material.

Rademacher District

The Rademacher mining district (fig. 21) of approximately 50 square miles embraces a group of low hills at the northeast end of El Paso Mountains. It is 3 to 8 miles south of Ridgecrest, along the east border of Kern County. Gold has been the principal mineral product, though silver, copper, tungsten, clay, volcanic ash, and wollastonite also have been produced.

The district was formally organized, probably in the 1890s. The oldest and apparently most productive gold mines are the Gold Bug, Bellflower (Huntington), and Rademacher. Others include the Wildcat, Red Wing (Haunita, Crown Consolidated), Stellar, Jerry, Gold Pass, and Yellow Treasure mines. Silver and copper have been obtained from some of the gold mines and tungsten has been mined from the Lucky Boy mine. Deposits of clay and volcanic ash have been explored since about 1940 and wollastonite was mined and marketed during the 1930s. The district was probably most actively prospected for gold before 1904 when many claims were located and developed by short adits and shafts. Even the most productive gold mines have histories of intermittent operation and production. In 1957, only the Bellflower mine was equipped with a mill, and it was being rebuilt.

The Rademacher district is underlain mostly by granitic rocks, of Mesozoic age, which range in composition from quartz diorite to quartz monzonite. The granitic rocks contain small pendants of Upper Paleozoic metasedimentary rocks and also rhyolitic and dioritic dikes of probable Tertiary age. The crystalline rocks locally are overlain by Tertiary sedimentary and volcanic flow rocks.

Minute particles of free gold are in quartz veins which occupy faults and fractures in the granitic rocks. Most of the gold veins strike between N. 40° W. and N. 40° E. and dip steeply eastward. They range in thickness from a few inches to 8 feet. The largest and richest ore shoots have been found at or near intersections of veins with the dikes or with cross fractures. Most veins also contain oxides of copper and iron derived from coarse to fine grains of chalcopyrite and pyrite. At the Lucky Boy mine an undetermined, but probably small, amount of scheelite has been obtained from one of the small pendants.

The wollastonite is associated with calcareous rocks of probable late Paleozoic age in the southwestern part of the district. These rocks appear to be a northwestern projection of the rocks of the Garlock series that crop out in El Paso Mountains. Bentonitic clay and volcanic ash are present as sedimentary layers in nearly flat-lying Tertiary sedimentary rocks in a small area within the south-central part of the district.

Rand District

The Rand district (fig. 22, pl. 3) is on the eastern border of Kern County at the northeast end of the Rand Mountains. It includes about 50 square miles in Kern County and several additional square miles to the east in San Bernardino County. It is commonly referred to as the "Randsburg district" and includes one area, of about 4 square miles 2 to 4 miles south of the town of Randsburg, which is called the "Stringer district". The south end of the Stringer district overlaps the western end of the Atolia tungsten district which lies almost wholly in San Bernardino County. The most productive mines of the Rand district are in an area of about 10 square miles which includes the "Stringer district". The gold output of the Rand district has been valued at about $20,000,000, and exceeds that of any other district in Kern County with the possible exception of the Mojave district. In addition, it is the principal source of tungsten in Kern County.

Silver ore was sought with little success in the Kern County portion of the Rand district following the discovery of high-grade silver ore a few hundred yards east of the Kern County-San Bernardino County boundary near Red Mountain. All of the gold from the Rand district, however, contains silver and ranges from 730 to about 900 fine (Hulin, 1925, p. 88). Small quantities of

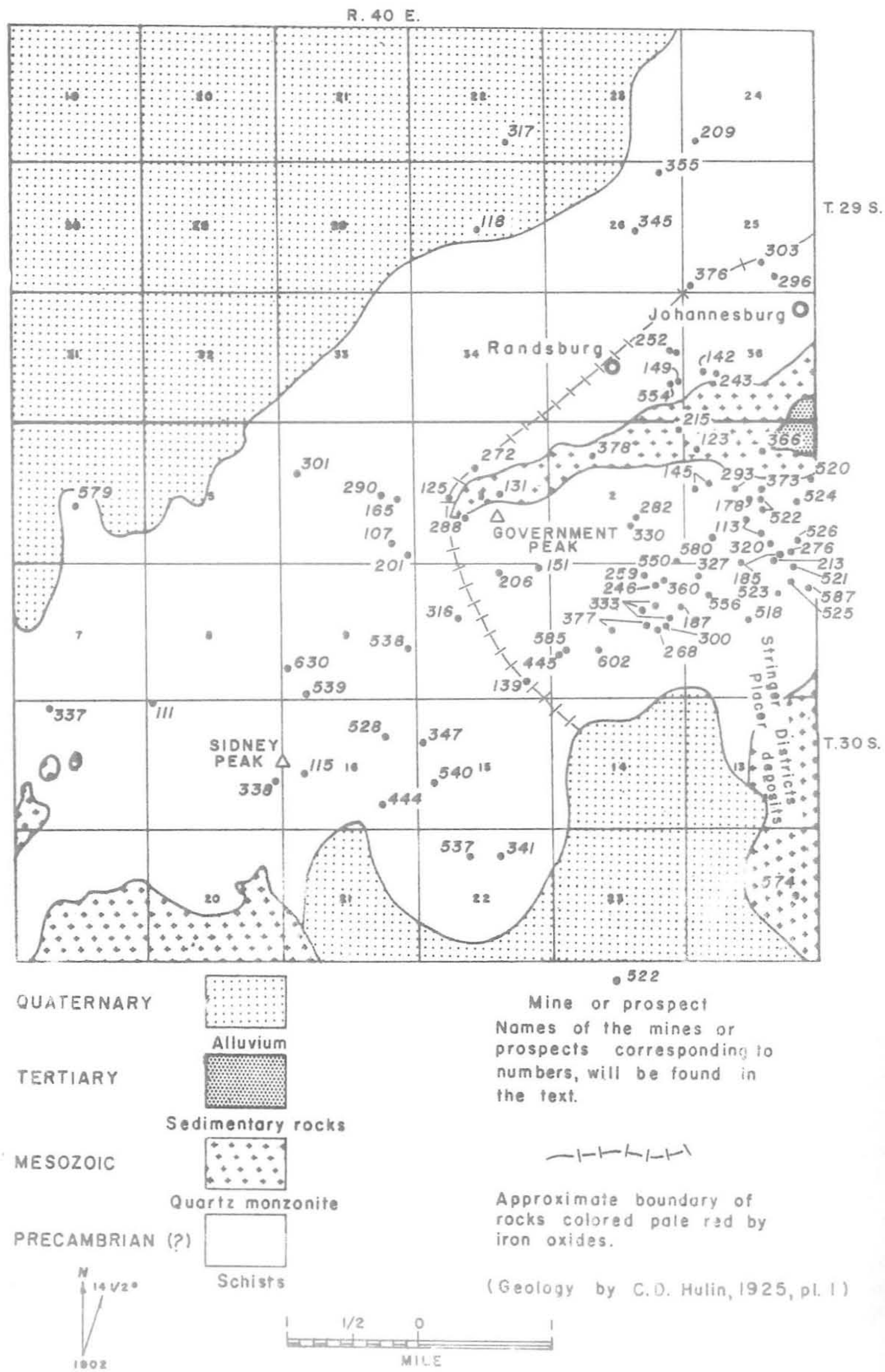

R. 40 E.
T. 29 S.
T. 30 S.
Johannesburg
Randsburg
GOVERNMENT PEAK
SIDNEY PEAK
Stringer Districts
Placer deposits
QUATERNARY
Alluvium
TERTIARY
Sedimentary rocks
MESOZOIC
Quartz monzonite
PRECAMBRIAN (?)
Schists
Mine or prospect
Names of the mines or prospects corresponding to numbers, will be found in the text.
Approximate boundary of rocks colored pale red by iron oxides.
(Geology by C. D. Hulin, 1925, pl. I)
N
14 1/2°
1902
1/2
0
1
MILE
317
209
355
118
345
303
376
296
252
142
149
243
554
215
123
366
378
272
520
145
293
373
524
301
290
165
125
131
282
178
522
107
288
330
113
526
276
580
320
201
151
550
327
213
259
185
521
206
246
360
523
587
333
556
518
525
316
377
187
300
538
585
268
630
445
602
539
139
337
111
528
347
115
540
338
444
537
341
574
522

Figure 22 (opposite). Geology, mines, and prospects of the Rand district.

GOLD

107 Allstate
111 Arizona
113 Baltic
115 Barnett
118 Beck
123 Big Dike
125 Big Gold
131 Bobby
139 Buckboard
142 Butte
145 California
149 Consolidated
151 Culbert
165 Elizabeth
178 GB
185 Gold Coin
187 Gold Crown
201 Granton
206 Gunderson
209 Hard Tack
213 Hawkeye
215 Hercules
243 King Solomon
246 La Crosse
252 Little Butte
259 Lucky Boy
268 Merced
272 Minnehaha
276 Monarch Rand
282 Nancy Hanks
288 New Deal
290 Noble
293 Old Baldy
296 Operator Divide
300 Pearl Wedge
301 Pestle
303 Pinmore
316 Rainbow
317 Rand Gold Dredging Assoc.
320 Red Bird
327 Rizz No. 2
330 Rose M.
333 Santa Ana
337 Sidewinder
338 Sidney
341 Silverton

GOLD—Continued

345 Snowbird
347 South Rand
355 Sunbeam
360 Sunshine
366 Wade H No. 2
373 W. H. No. 1
376 Windy
377 Winnie
378 Yellow Aster

MANGANESE

444 BHP
445 Big Indian

SILVER

518 Jasper
520 Mizpah-Nevada
521 Nondescript
522 St. Lawrence Rand
523 Togo
524 Treasure Hill
525 Vienna
526 White Horse Rand

STONE

528 Banded Rocks

TALC

537 Desert View
538 Roseo
539 Serpentine
540 Tommy Knocker

TUNGSTEN

550 Barbara-Diana
554 Billie Burke
556 Bluebird
574 Gardner
579 Hawk
580 Hess
585 Holly Rand
587 Jersey Lily
602 Martha
630 Tungsten Mountain

manganese and building stone have been produced from the district and several deposits of talc have been explored.

The first discovery of gold in the district was in 1895 at the site of the Yellow Aster mine. Soon thereafter most of the subsequently productive sources were found, and gold was produced steadily until 1918. Since then gold-mining activities have been less intensive except for a period of rather short duration in the 1930s following the increase in the price of gold from $20 per ounce to $35 per ounce.

Lode and placer deposits of scheelite were discovered in the Atolia district southeast of the Rand district in San Bernardino County in 1904. Placer scheelite later was found in the Stringer district northwest of Atolia. Still later, scheelite-bearing veins were found in bedrock beneath the placer material in the Stringer district and in bedrock elsewhere in the Rand district. As recently as 1957 scheelite-bearing veins were discovered in the Rand Mountains. The two principal periods of scheelite production were during World War I and between 1948 and 1956, at which times the prices paid for tungsten concentrates were several times the normal market price.

Nearly all of the lode gold deposits in the Rand district are veins along faults, but at the Yellow Aster mine gold is present in a series of closely spaced veinlets that occupy small fractures. The principal country rocks are Precambrian? Rand schist and Mesozoic Atolia quartz monzonite. Most of the mines are in Rand schist, which is the more widespread. Gold mineralization has also taken place along walls of a few of the Tertiary rhyolitic and dioritic dikes which are common throughout the district. The largest gold mines in the Rand district are in an area of a few square miles in which the schist and quartz monzonite are colored pale red by iron oxides (fig. 22).

In general the veins are between a well-defined hanging wall and a less-well-defined footwall, and contain numerous smaller shears. The richest parts of the veins are ore shoots which are variously oriented and localized mainly at the intersections or junctions of faults, fractures, or shear zones. Nearly all of the gold is in very minute grains in silicified, brecciated, and iron-stained rocks, usually in the footwall of the veins. Some pockets of ore contained several ounces of gold per ton, but the average value of all ore mined and treated is probably less than $10 in gold per ton, mostly because the large volume of ore mined from the glory hole at the Yellow Aster averaged less than $5 per ton in gold. The maximum depth to which gold veins in the Rand district have been mined or explored is about 600 feet below the surface. Most mining was stopped where unoxidized sulfides were found in the veins. In general the gold content decreased where the sulfides were found, but also, many of the mills in the district were not capable of recovering gold from ores containing sulfides and sulfide-bearing ore was not mined. The veins are variously oriented. In the Yellow Aster mine the principal veins and the series of veinlets strike west and are nearly vertical. Immediately northeast of Randsburg, four mines are along a continuous system of northwest-trending veins which dip moderately steeply northeast. At localities north of Johannesburg and southeast of Randsburg most of the veins strike north and dip moderately to gently east. About two miles south of Randsburg, in the Stringer district, the veins (stringers) strike northeast and are nearly vertical.

Some of the principal gold mines of the Rand district are listed below together with the approximate value of the gold as reported by Tucker and Sampson (1933, p. 280-335) and mine owners:

Big Dike	$200,000
Big Gold	500,000
Buckboard	500,000
Butte	2,000,000
King Solomon	500,000
Little Butte	400,000
Minnehaha	100,000
Operator Divide	600,000
Sidney	250,000
Sunshine	1,000,000
Yellow Aster	12,000,000

Most of the output of placer gold has been mined from alluvial deposits in the Stringer district on the southeast flank of the Rand Mountains and along the northwest flank of the Rand Mountains due north of Randsburg. In general, the mining of placer gold deposits is hindered by the lack of abundant water nearby. Dry concentrating has been attempted on a small scale and with limited success, but most of the placer gold recovered to date has been as a co-product of placer tungsten in the alluvial deposits.

The principal source of tungsten in the Rand district is placer material in the Stringer district. Here, scheelite is found in fragments as much as several inches in diameter. Most of these deposits are low grade and occupy poorly defined buried stream channels near the bedrock. Numerous stringers of scheelite have been found and mined in bedrock beneath the alluvium and in exposed bedrock within a few hundred yards of the northwest edge of the alluvium. Scheelite has also been found in several of the gold veins in the Rand district. One of the most recently discovered productive sources of scheelite is a deposit along the footwall of a gold vein in the Billie Burke mine at the east end of Randsburg. The discovery in 1956 of the Gardner vein a few hundred feet west of the county boundary marked the first discovery of a mineable scheelite body in the Kern County part of the Atolia district.

Several deposits of manganese have been explored in the Rand district, but as late as 1958 none of them had yielded more than a few tons of hand-sorted shipping ore. One prospect, the B.H.P., has yielded in recent years a few hundred pounds of rhodonite suitable for cutting and polishing and may have been the source of a few tons of manganese ore mined several decades ago. Most of the manganese is associated with quartzose beds in

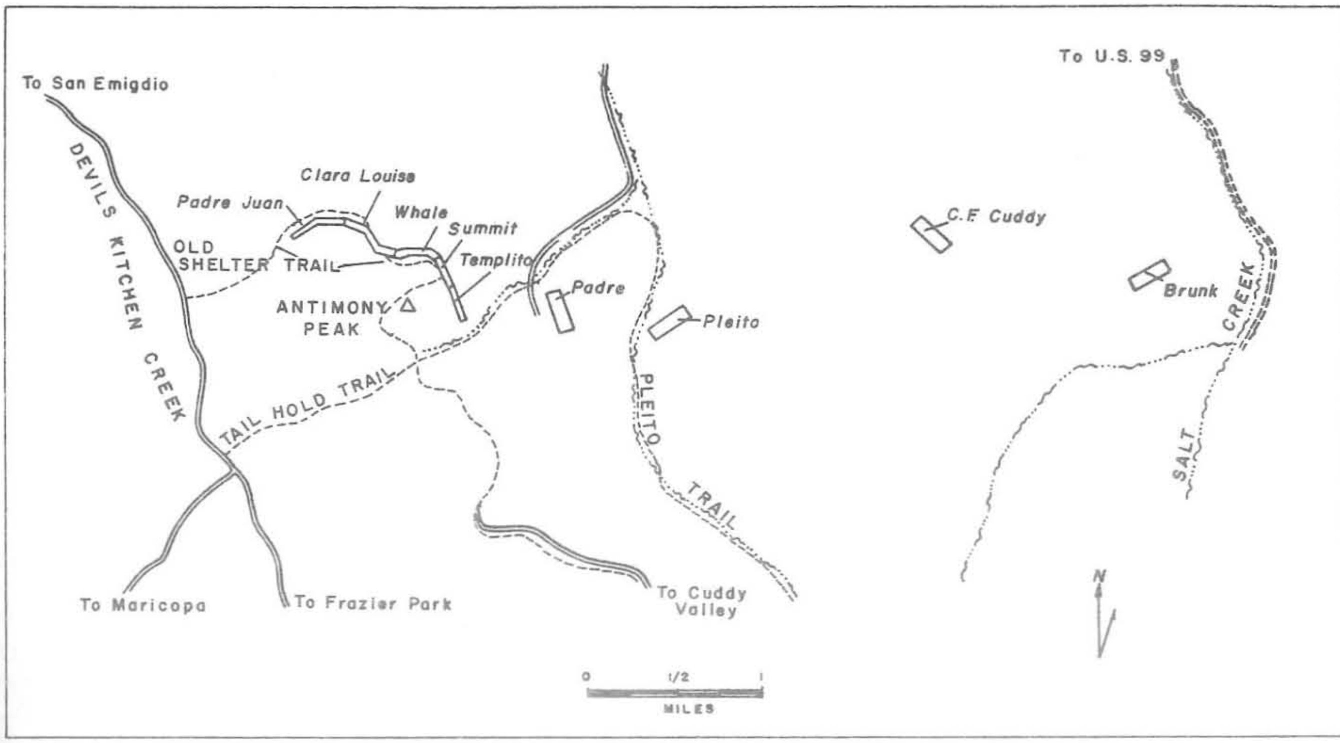


Figure 23. Claims in the San Emigdio district.

Rand schist and contains too much silica for metallurgical applications.

A few bodies of talc, mostly in the western part of the Rand district, have been formed by alteration of actinolite schist. They have been explored by means of shallow prospect holes and bulldozing. Because the talc deposits are low grade, in layers only a few feet thick at most, and would have to be mined by underground methods, they have not been mined to date.

Several tens of tons of pale-colored, iron-stained rhyolite and white vein quartz have been mined as ornamental stone. Carbonate rocks which contain mariposite have also been the source of small quantities of ornamental stone.

Red Mountain Tungsten District

The Red Mountain tungsten district (fig. 5) is 5 to 7 miles south of Havilah and lies east of the paved road between Havilah and Walker Basin. It includes about 4 square miles in the southeast part of T. 28 S., R. 32 E., M.D.M., on the south end of Red Mountain in the southern Sierra Nevada. The total value of tungsten concentrates from the district has not been determined, but is probably between $75,000 and $200,000. Most of the tungsten ore has been mined from the Tungsten Chief group, which has been operated intermittently since it was discovered by A. D. Zuck in 1918.

Most of the tungsten ore has been mined from tactite bodies, which commonly are found along contacts between limestone and mica schist of the pre-Cretaceous Kernville series, and between limestone and Mesozoic biotite quartz diorite. The tactite bodies range in maximum dimension from a few feet to several tens of feet. Scheelite-bearing quartz veins along the contact zone between quartz diorite and mica schist also have been mined. The largest scheelite-bearing quartz vein yet developed in the area is at the Rocky Point mine. This vein, which is 10 feet wide and 50 feet long at the surface, yielded $13,000 in scheelite concentrates during the period 1940-43.

Scheelite is the only tungsten-bearing mineral that has been found in the Red Mountain area. It is found mostly as grains from 1/16- to ½-inch in diameter, although some deposits contain crystals an inch or more in diameter. Scheelite typically is sparsely disseminated through the tactite, and only rarely is an entire body sufficiently scheelite-rich to consist wholly of ore. Most of the tungsten ore mined to date contains from 0.3 to 2 percent of WO_3, but some has contained 3 percent or more. A few small but very high-grade pockets and lenses of scheelite, both in the tactite and quartz vein deposits, have been mined.

In recent years, the principal mine development and mining operations in the Red Mountain area have been at the Buckhorn mine, Tungsten Chief group, and U-See-Um group.

San Emigdio District

The San Emigdio mining district (fig. 23) embraces a few tens of square miles of steep mountainous terrain in the vicinity of San Emigdio Mountain, Antimony Peak,

and Cuddy Valley in southwestern Kern County. The district's principal output is approximately 600 tons of metallic antimony produced from ore obtained mostly from the San Emigdio mine.

The district is underlain by Mesozoic granitic rocks intrusive into gneiss, schist, and carbonate rocks of undetermined age. These crystalline rocks crop out in a northwest-trending belt that lies northwest of the San Andreas fault and south of a thick succession of Tertiary marine and continental sedimentary rocks. The largest bodies of metamorphic rocks are about a mile wide, about 3 miles long, and trend north-northwest. Most of them are only a few hundred yards in their longest dimension, and many of these consist entirely of limestone or dolomite.

The largest known antimony deposit is at the San Emigdio mine on the north and northeast slopes of Antimony Peak. At this mine stibnite and several oxides of antimony are disseminated in lenticular quartz-rich masses. These are discontinuously distributed along a northwest-trending, southwest-dipping shear zone in Mesozoic quartz diorite. Although several antimony deposits east of the San Emigdio mine contain lenses of high-grade ore, none of them has proved large enough to mine profitably. These deposits are accessible only by foot trails.

A few of the carbonate bodies near Frazier Park have been prospected and have yielded a few tons each of white coarse-crystalline limestone and dolomite. Other pendants farther north are less accessible and only in recent years have been considered as possible sources of limestone. Little is known concerning the purity, size, and distribution of these bodies pending detailed geologic mapping or sampling of them.

Tehachapi District

The Tehachapi district includes foothills on the north and south of Tehachapi Valley. Lime was produced from 1888 to 1928, portland cement from 1909 to the present, adsorbent clay from 1929 to 1936, and roofing granules have been produced since about 1950. Gold and building stone were produced mostly around 1900, and tungsten in the 1940s and 1950s. Tertiary nonmarine rocks have been the source of several types of stone suitable for cutting and polishing by lapidaries.

The rocks of principal commercial interest, in terms of total value of output, are limestone bodies preserved in pre-Cretaceous roof pendants. They have been utilized both for lime and portland cement. The limestone is in lenticular masses as much as 500 feet thick, half a mile wide, and half a mile long. The pendants, which also contain quartzite and other metasedimentary rocks, are in Mesozoic granitic rocks—the most abundant rocks in the district. Tertiary nonmarine sedimentary and volcanic rocks crop out over a few tens of square miles northeast of Tehachapi. Tertiary bentonite clay in layers interbedded with mudstone, tuffaceous shale, and tuff was mined for several years for use as an adsorbent clay in petroleum refineries, and Tertiary sandstone was quarried to obtain dimension stone and rubble, mostly around the turn of the century. Since about 1950, tuffaceous rocks in the same area have been mined, crushed, and sold as roofing granules. Quaternary alluvium which forms the valley floor has been utilized as a source of silica and alumina for portland cement.

Scheelite has been mined from small lenses in quartz veins at two localities about 1½ miles apart and 4 miles south of Tehachapi. Gold also is found in quartz veins in the same area. They have yielded only a small proportion of the total mineral output of the Tehachapi district.

Weldon Tungsten District

The Weldon tungsten district (fig. 24) is a few miles south of Weldon, a community on State Highway 178, 44 miles northeast of Bakersfield, in the Sierra Nevada. It encompasses at least 12 bodies of scheelite that lie within a northwest-trending belt, approximately 1 mile wide and about 8 miles long, which trends northwest across the southwest part of Nichols Peak in the Piute Mountains. The northwest end of the belt is at the mouth of Long Canyon, which is 3¼ miles southwest of Weldon; the southeast end is near Rocky Point, a prominent but small peak near Kelso Creek, 7 miles southeast of Weldon.

Scheelite, the only tungsten-bearing mineral noted in the district, is in garnet-epidote tactite. The tactite is in pendants of pre-Cretaceous metamorphic rocks in Mesozoic granitic rocks. The scheelite-bearing tactite is most common in several pendants, a few tens of feet to several hundred feet long, that lie near the northeast flank of a much larger pendant (fig. 24). The scheelite grains range in size from less than one-sixteenth of an inch to half an inch or more in diameter. Most of the grains are sparsely disseminated along planes within tactite. The scheelite-bearing tactite generally can be recognized in the field by a very dark, almost black color, a friable nature in weathered outcrops, and the presence of green copper oxides. The scheelite-bearing zones occupy a small proportion of the total volume of the tactite, and most of them are no more than a few inches wide and a few feet long.

Tungsten concentrates have been recovered from at least four mines in the district—the B. and F., Last Chance, Stardust, and Lucky Boy—and others may have had uncredited production. The total output of the district is probably several tens of units of WO_3 concentrates, most of which has been mined since 1941.

Woody (and White River) District

The Woody district is in northern Kern County about 30 miles northeast of Bakersfield. The area embraces about 70 square miles included in T. 25 and 26 S. and R. 29 and 30 E., M.D.M. Most of the mines are clustered in two areas—one just south of Woody, the other 2 to 3 miles south of White River near the Tulare County line. In the following text they are considered as one district.

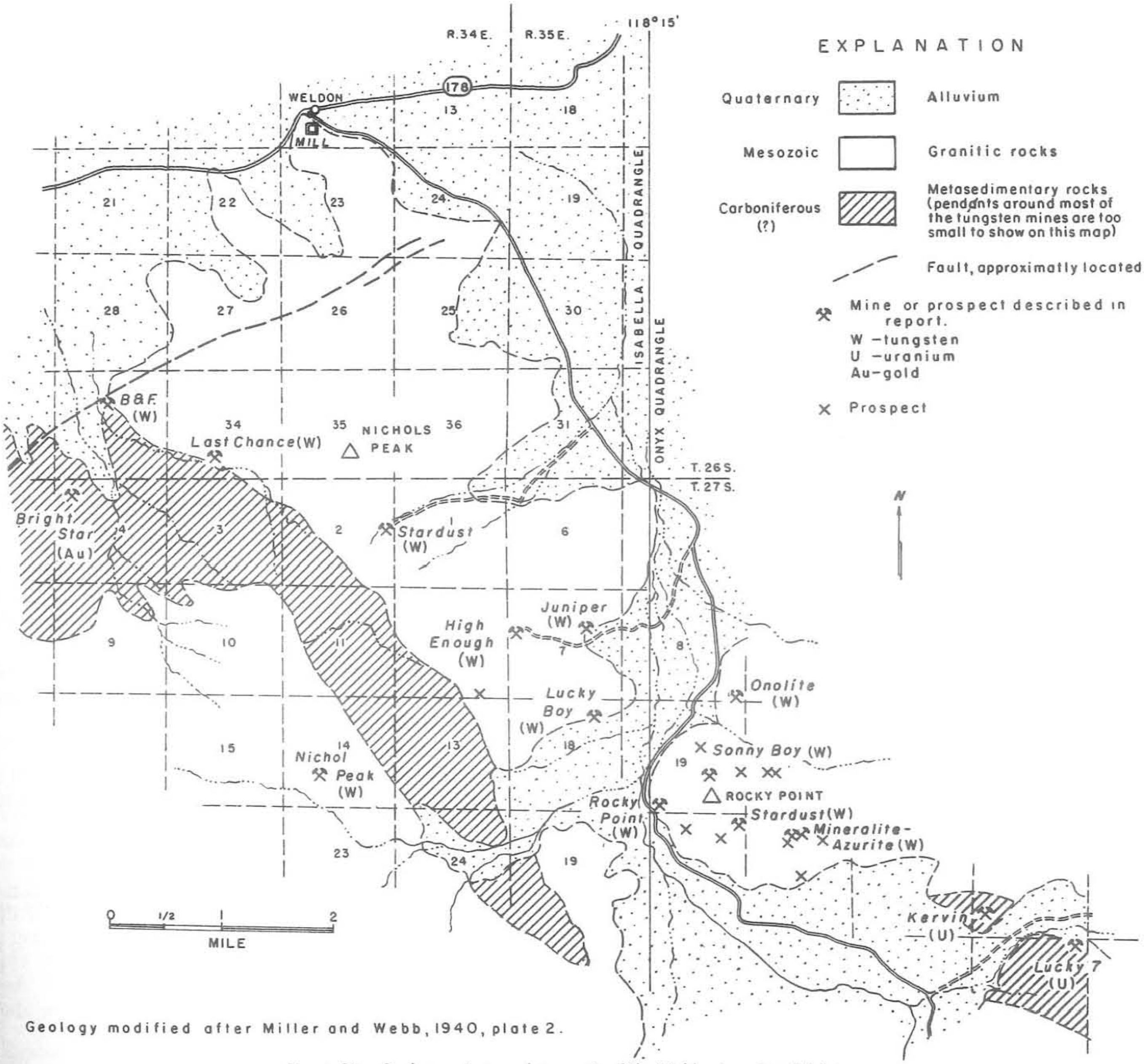


Figure 24. Geology, mines, and prospects of the Weldon tungsten district.

Deposits of gold, copper, tungsten, and iron are known to exist in the area, but production records and information concerning the early history of mining are lacking. Gold was mined in the district as early as the late 1850s, and most of the total gold output of the district probably was produced before 1890. Only the Blue Mountain mine has been worked seriously since 1890. It was active during the period 1909-23 and again briefly from 1929-31 (see tabulated list). Tungsten mines in the district were most active during the periods 1940-43, and 1952-56, when more than 15,000 units of WO_3 was produced. The Greenback Copper mine, a quarter of a mile south of Woody, producer of almost all the recorded copper output from the district, yielded an estimated 600,000 pounds of copper during the years 1890 to 1900 and 1913-18. The only body of iron ore in the district is at the Iron Mountain deposit where concentrations of magnetite in schist have been reported. No production has resulted from the limited exploration done at this property.

Granitic rocks of the southern Sierra Nevada batholith underlie most of the Woody district, but a few roof pendants composed of metasedimentary rocks form some of the more resistant peaks. These pendants range from a few tens to a few hundreds of feet in width and from a few hundreds to a few thousands of feet in length. Oligocene nonmarine sedimentary rocks border the district on the west, but no ore deposits are known to be associated with these rocks.

MINES AND MINERAL DEPOSITS

Forty-three mineral commodities are discussed in the following pages. Each discussion of a mineral commodity consists of three parts: brief introductory statements about the distribution, geology, mineralogy, and production of the commodity; descriptions of principal or selected deposits; and tabulations of information about known and reported deposits in the county. Mine descriptions are based on previous descriptions that were made when more of the mines were accessible, and on newly acquired data obtained by the writers. Many of the mines that have been described several times in previous reports are discussed herein only in the tabulated sections. Newly discovered prospects, though their production to date may have been insignificant, are described because they represent potential sources of mineral products. Published references to the properties are cited in the tabulated lists. References that refer to tables only are denoted by a "t" following the page number.

Antimony

Antimony has been mined from several areas in Kern County (fig. 25). The principal operation has been the San Emigdio mine, on Antimony Peak northwest of Frazier Park, from which about 600 tons of metallic antimony has been produced (Jermain and Ricker, 1949, p. 2). This is probably more than half the total antimony output of Kern County. The other deposits are in the Sierra Nevada and Tehachapi Mountains. The principal mines and prospects in these areas are the Big Oscar prospect near Greenhorn Summit; the Rayo, Tom Moore, Alice, and Jenette-Grant mines and prospects in the vicinity of Bodfish; the Mammoth Eureka, Studhorse Canyon, and Wiggins mines near Loraine in Caliente Creek; the Antimony Consolidated (Amalia) mines near Cinco; and the Maharg and Houghawott prospect in the Tehachapi Mountains west of Mojave. Antimony is associated with silver in veins, near Randsburg, on the extreme east edge of Kern County. These veins lie west of the Kelly mine, which is in San Bernardino County.

The total value of antimony produced from mines in Kern County is approximately $80,000 (Tucker, and others, 1949, p. 206)—about one-third of the value of all of the antimony produced in the state. Since 1900 the principal productive periods in Kern County have been 1915-17, 1925, 1928, and 1939-42, when high prices prevailed. The most recent activity was in 1952 and 1953 at two mines near Loraine and one near Greenhorn Summit, and in 1958 in the vicinity of the San Emigdio mine.

The principal antimony ore mineral in Kern County is stibnite (Sb_2S_3), which in most places is partly to nearly wholly altered to antimony oxides. Of these oxides, valentinite (Sb_2O_3) is the most common and is probably present in all deposits. The other oxides—cervantite (Sb_2O_4?), kermesite (Sb_2S_2O), and stibiconite ($Sb_3O_6(OH)$?)—are probably much less common than valentinite, but have been identified at several localities (Murdoch and Webb, 1956). Native antimony is rare, but has been found at several of the properties near Bodfish, at the San Emigdio mine, and near Cinco.

The antimony mineralization in Kern County is confined to quartzose bodies in shear zones that cut granitic rocks or metamorphosed sedimentary rocks. Most of the bodies are lenticular.

*Big Oscar Antimony Deposit.** Location: Secs. 9 and 16, T. 25 S., R. 32 E., M.D.M., in the Greenhorn Summit

* By T. E. Gay, Jr.

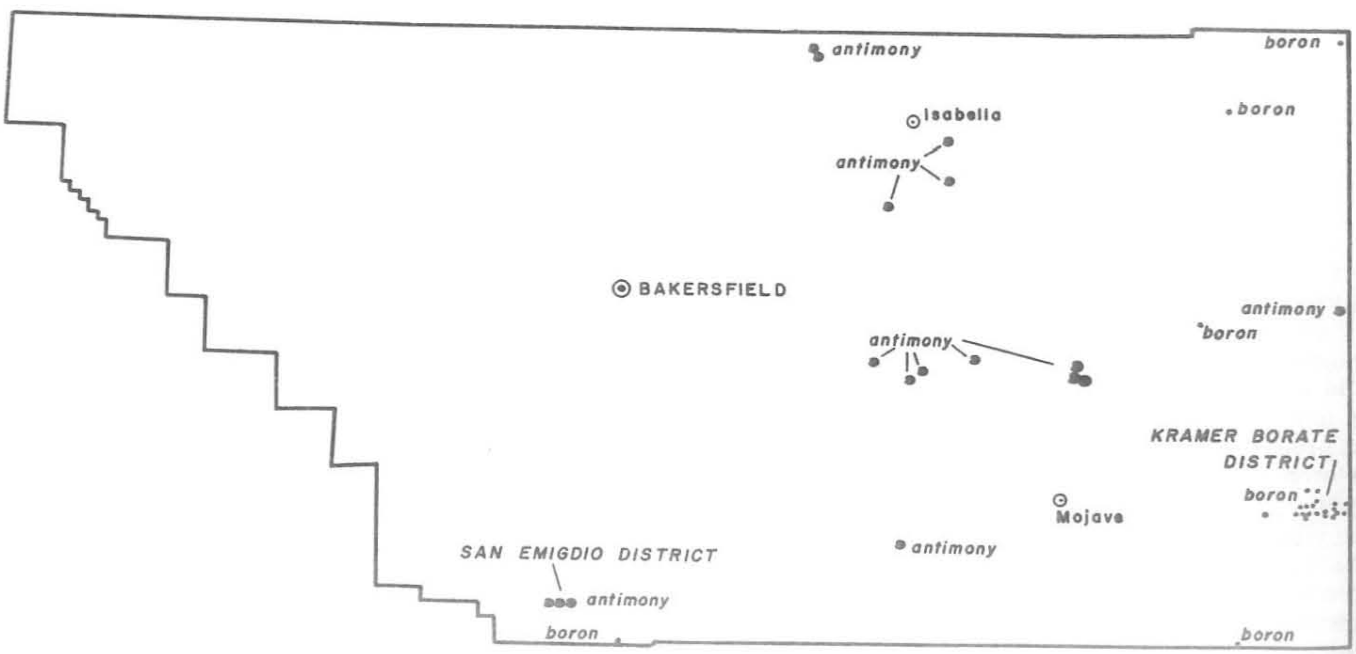


Figure 25. Distribution of antimony and boron deposits in Kern County.

district, on Cow Creek, about 1 mile down Cow Creek trail, about 2 miles north of Greenhorn Summit. Ownership: Abaca Mining Company, consisting of Melvin M. Ford, Box 293, Inyokern, and Oscar F. Lipnitz, Glennville, owns seven lode claims.

The Big Oscar deposit, discovered in 1948, was explored in 1953-54 with the financial aid of a Defense Minerals Exploration Administration loan, but no production resulted.

Country rock is medium-grained Isabella granodiorite, widely distributed in the region, but exposed only in small outcrops in the heavily wooded vicinity of the deposit. Quartz veins, which range in width from 1 inch to 2 feet, trend north and dip nearly vertically, in a zone reported to be 30 to 40 feet wide. Several shear zones strike northeast and dip steeply to the southwest. Stibnite is present in some of the quartz veins, and is sparsely present as a replacement of the gougy altered granodiorite in some of the shear zones. Assays are erratic but an average of 5 percent antimony was reported by the owners.

A 28-foot shaft was sunk in 1948 on the southeast bank of Cow Creek in the zone of quartz veins, and a 26-foot shaft was sunk in a stibnite-bearing shear zone in the creek bottom. Early in 1953 a DMEA contract for a $7,500 exploration program was approved, the U.S. Government's share to be $5,625. This project called for the deepening of the 28-foot shaft to 88 feet; a 50-foot drift south on the vein, and a 40-foot crosscut, both on the 70-foot level. By mid-1954 the shaft was enlarged to 4 by 7 feet, deepened to 90 feet, timbered in two compartments down to the 70-foot level where a 13-foot drift was driven south, and a 30-foot crosscut was driven to the west. Below the 70-foot level, water was an acute problem; and timber, although needed to hold the heavy ground, was not emplaced. Small amounts of stibnite with pyrite were found, as veinlets and joint fillings in the granodiorite, but the DMEA contract was terminated in the fall of 1954 without a discovery having been certified. The property has been idle since 1954; water stands in the shaft from 30 to 50 feet below the collar.

Mammoth Eureka Mine. Location: SE¼ sec. 33, T. 30 S., R. 34 E., M.D.M., 17 miles east of Caliente, near crest of a ridge north of Indian Creek, a tributary to Caliente Creek. Ownership: Clyde E. Mallachowitz, 1102 Kern St., Bakersfield (1958).

The Mammoth Eureka mine was the source of an undetermined quantity of antimony ore during World War I. Since then the veins have been explored and sampled but no ore has been sold.

The mine area is underlain by Tertiary volcanic rocks, probably of andesitic composition, and apparently of intrusive origin. The antimony minerals are in veins in a silicified zone about 1,000 feet long and a few hundred feet wide. The silicified zone underlies the upper southwest side of the highest part of a northwest-trending ridge. The veins occupy faults or fracture zones in the andesitic rocks, are from a few inches to several feet wide, and are several feet to several tens of feet long. The walls are well-defined to indistinct. Wall rocks are locally so silicified that field identification is not possible. The principal veins strike N. 40-45° W. and dip 60-70° NE. in a zone several tens of feet wide near the crest of the ridge. One of the veins is exposed in a crosscut adit near the northwest end of the high part of the ridge and another is exposed in drift adits several hundred feet to the southeast and at the crest of the ridge. The two veins appear to mark the sides of a zone about 1,000 feet long and several tens of feet wide that contains several other northwest-trending veins. Three veins are exposed from 100 to 200 feet farther down the southwest slope and about midway between the northwest and southeast ends of the ridge. One vein strikes N. 65° E., dips 70° SE.; another strikes N. 70° E., dips 70° SE. to vertically; and the third strikes N. 80° W., dips 70° NE. The N. 70° E.-striking vein is at least 130 feet long, 2 to 4 feet wide, and has been explored to a depth of about 75 feet. The other veins range in width from a few inches to 3 feet; the maximum exposed length is a few tens of feet.

The veins are composed principally of quartz and stibnite with silver, pyrite, and arsenopyrite. Most of the stibnite is in fine, evenly disseminated grains, commonly so small and abundant that the siliceous vein material has a dull gray color. Some of the stibnite is in lenses, stringers, and irregular aggregates of coarse crystals. These masses appear to be evenly distributed, and few exceed 2 inches in width and a few feet in length. Near the surface some of the veins contain banded chalcedony or quartz. Silver, in an unidentified form, has been noted in the veins by George Ramey, who leased the property at one time.

The most extensive working is a 390-foot crosscut adit driven approximately N. 50° E. from the southwest side of the northwest part of the ridge. The face of the crosscut is probably about 300 feet below the surface. The vein at the end of the crosscut has been followed by a drift driven a few feet southeast. At a point approximately over the face of the crosscut adit and at the northwest tip of the ridge is a 30-foot drift adit driven N. 45° E. along a short vertical vein. About 15 feet from the portal is a vertical winze 15 or more feet deep. Several hundred feet to the southeast of these adits, and on the southeast part of the ridge, are several other adits which appear to be the oldest workings on the property. These workings consist of two northwest-trending drift adits with portals about 100 feet apart horizontally and 50 feet apart vertically. A raise from the lower adit opens at the surface about midway between the portals of the drift adits. The upper drift adit is about 50 feet long and the lower one is about 100 feet long. Two drift adits were driven northeast along a vein in the middle part of the southwest slope about 300 feet below the crest of the ridge. The lower drift adit is 80 feet long. The upper drift adit is about 50 feet above and 100 feet northeast of the lower drift adit and is 130 feet long. In the upper drift adit the vein has been stoped from the floor of the

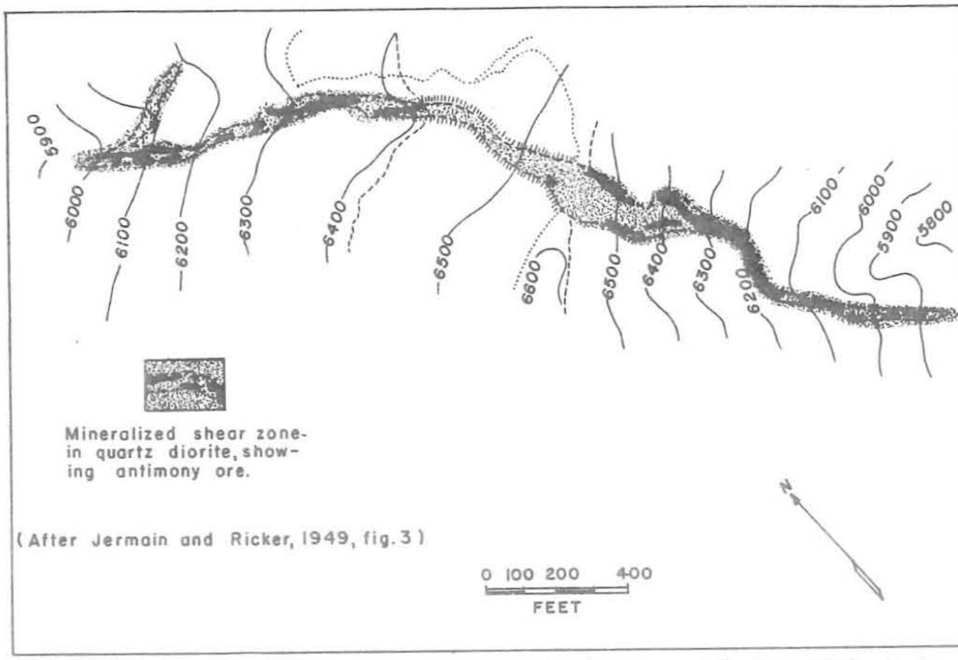


Figure 26. Antimony-bearing bodies in northwest-trending shear zone at the San Emigdio (Antimony Peak) mine.

adit to the surface (about 50 feet) and about 60 feet along the vein. An underhand stope, about 20 feet deep, was probably the source of ore mined and shipped during World War I. About 400 feet downslope and southeast of the stope in the upper adit is a 180-foot crosscut adit driven N. 5° W. It cuts only andesitic rocks.

In spite of the development of the Mammoth Eureka mine by seven adits, large segments of the veins encountered in them are unexplored and other veins have not been developed at all.

*San Emigdio (Antimony Peak) Mine.** Location: Secs. 9, 10, and 11, T. 9 N., R. 21 W., S.B.M., on north and northeast slopes of Antimony Peak, 8 miles northwest of Frazier Park. The mine is accessible by trails from San Emigdio Creek, Pleito Creeks, and Pleito Ridge. Ownership: Kern County Land Co., 2920 H St., Bakersfield, owns five patented claims.

The San Emigdio antimony deposits were probably first worked by Indians as the source of pigment for making paintings which can still be seen on sandstone in the vicinity of Antimony Peak (Jermain and Ricker, 1949, p. 2). The deposits were probably known to the early missionaries (Jermain and Ricker, 1949, p. 2) and may have been mined by them (Angel, 1890, p. 226; Bowers, 1888, p. 680). W. P. Blake, who examined the deposits in 1853 and again a few years afterward, reported the remains of old smelting works (1857, p. 291-295). Claims were staked at the mine site sometime between 1872 and 1878. About 1878 the Boushey Brothers erected a small concentrating plant and smelter in San Emigdio Canyon and commenced mining the deposits about 1½ miles to the east. Sixty tons of metallic antimony was produced in 1882. Later, the Anglo-American Association was formed; it is reported to have shipped several carloads of metallic antimony to New York during 1885 (Jermain and Ricker, 1949, p. 2). Intermittent mining continued until 1892, when Kern County Land Co. purchased the property; since then, lessees have mined the deposit during two brief periods. One group of lessees mined and shipped five or six carloads of ore during World War I, and, in 1941, Charles B. Fife, a lessee, shipped five tons of ore which contained 35 percent of antimony. Jermain and Ricker (1949, p. 2) estimate that no more than 600 tons of metallic antimony has been produced from the San Emigdio mine since 1882. Most of the ore mined before 1900 was carried by pack animals 1½ to 2½ miles to concentrators and smelters in San Emigdio Canyon. Metallic antimony from the smelter was hauled in wagons to Bakersfield, then by railroad to other points.

At the San Emigdio mine, stibnite and antimony oxides are found in siliceous lenses which are irregularly distributed along a very poorly exposed shear zone in quartz diorite. The shear zone strikes N. 40° W., dips about 55° SW., is from a few feet to 100 feet wide, and is at least 2,700 feet long. It lies along the north side of Antimony Peak beneath a shallow, soil-covered depression. The soil overlying the shear zone, however, is commonly paler than that overlying the quartz diorite. The antimony-bearing lenses are most abundant in the southeast third of the zone (fig. 26). They are along both walls of the shear zone; some of them extend diagonally from one wall to the other. In general, the long axes of the lenses are parallel to the walls of the shear zone.

* Abstracted mostly from a report by Jermain and Ricker (1949, 5 p.).

ANTIMONY

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
1	Alice mine	Reported in sec. 2, T28S, R32E, MDM, Clear Cr. dist., 3/4 mile northeast of Havilah (1949); not confirmed, 1958	R. L. and Alice Coughran, 316 Tollhouse Dr., Bakersfield (1958)	Irregular masses of stibnite in porphyritic quartz diorite.	Developed by 75-foot adit and 60-foot winze. Several small shipments in 1939 and 1940. Idle. (Crawford 96:31; Tucker, Sampson, Oakeshott 49:206,252t).
2	Amalia mine	Reported in secs. 5, 8, T31S,R36E, MDM, 6 miles west-southwest of Cinco, on Antimony Flat	Undetermined, 1954; Antimony Mines Co., R. C. Golden, Bodfish (1949)	Stibnite-bearing veins in granodiorite.	One claim with shallow shafts and open cuts. Mined ore hauled to mill near Gypsite (near Cantil); several shipments of stibnite ore were made to Harshaw Chem. Co., El Segundo in 1940. Mine also operated in 1917 and 1918. Idle since 1940. See Cowboy No. 1. (Tucker, Sampson, Oakeshott 49:206-207, 252t).
3	Antimony Consolidated mine	SW cor. sec. 5, T31S, R36E, MDM, Antimony Flats, 6 miles west-southwest of Cinco	Undetermined, 1958; Arthur Asher, Los Angeles (1949)	Poorly-exposed quartz vein in granodiorite contains stibnite and fine-grained sulfides. Vein strikes N. 30° W., dips 70° NE., and is exposed in trenches and shafts for a strike distance of about 600 feet. Parallel vein a few tens of feet long exposed about 400 feet to northeast from southeast end of main vein.	Four patented claims (secs. 5 and 8). Three caved shafts of undetermined depth and 7 trenches on principal vein. Near-surface stopes evident by subsiding ground near shaft collars. One shaft and 3 trenches on northeast vein. Production undetermined; long idle. (Boalich, Castello 18b:11t; Brown 16:475; Tucker 29:21; Tucker, Sampson, Oakeshott 49:252t).
	Antimony Dyke group	Reported in Loraine dist. (1918)	Undetermined, 1958; George Ramey and A. Carlson, Caliente (1918)	Undetermined.	Uncorrelated old name. Probably early name of Studhorse Canyon mine. (Boalich, Castello 18b:11t).
	Antimony Peak mine				See San Emigdio mine in text. (Tucker, Sampson, Oakeshott 49:207, 252t).
	Betty Lou				Uncorrelated name. May be same as Betty Lou mine listed under tungsten. Produced about 40 tons of antimony concentrates in 1940 and 1941.
4	Big Oscar prospect	NW¼ sec. 16, T25S, R32E, MDM, 2 miles north of Greenhorn Summit, on Cow Cr.	Melvin M. Ford, P.O. Box 293, Inyokern, and O. F. Lipnitz, Glennville (1954)	Stibnite in veins in granodiorite.	See text.
5	Big Pine group	Sec. 10, T9N, R21W, SBM, 15 miles west-northwest of Lebec, on north slope of Antimony Peak, in vicinity of San Emigdio mine	Big Pine Mining Co. Carl Hartzell, P.O. Box 102, Oildale, and Ernest E. Meadows, 408 Locust St., Bakersfield (1958)	Stibnite and other antimony minerals in siliceous lenses along a shear zone which strikes N. 40° W. and dips about 55° SW.; in quartz diorite. Same vein as at San Emigdio mine.	Seven claims surrounding and between patented claims of San Emigdio mine. In 1957-1958, the owners constructed a road to the north side of Antimony Peak from Cuddy Valley and cleared out a 110-foot segment of an old adit. About 5 tons of selected ore was stockpiled in 1958 at the mine camp about half a mile south of the mine. See San Emigdio mine for production history from this vein. Part of these claims formerly held by Kern County Land Co.
	Black Sambo prospect			Stibnite in quartz diorite.	See Susie Q mine under tungsten in text.
	Bousby				See San Emigdio mine in text. (Crawford 96:31).
	Boushy				See San Emigdio mine in text. (Angel 90:225; Crawford 94:21; 96:31).
6	Buffalo	Reported in sec. 7, T9N, R20W, SBM, 3 miles north of Cuddy Valley, about 3 miles east of Antimony Pk. (1904); not confirmed, 1958	Undetermined, 1958; A. Bessueille, Kern City (1904)	Two veins, each 4 feet wide, strike NW., dip NE., in porphyritic rock.	Uncorrelated old name; may be listed herein under different name. Developed in 1904 by 15-foot shaft, 60-foot inclined shaft, and 30-foot drift adit. Probably no production. (Aubury 04:19t).
7	Cowboy No. 1	NW¼ sec. 8, T31S, R36E, MDM, on south edge of Antimony Flat, 6 miles west-southwest of Cinco	Harry and Agnes R. Weldon, address undetermined (1954)	Small nodules and clusters of radiating stibnite blades disseminated along poorly-exposed quartz vein that strikes N. 80° E., dips 75° S.; in granodiorite.	Caved shaft about 20 feet deep and a shallow 70-foot trench along vein. May be Amalia mine. Long idle.
	Erskine Creek				See Tom Moore mine.
	Grace Darling	Reported in Erskine Creek (1896; not confirmed, 1957	Undetermined, 1957		Listed as old location in 1896. Ten tons of ore shipped from mine in 1893. (Crawford 94:21; 96:31).
8	Jenette-Grant mine	NW¼ sec. 18, T28S, R34E, MDM, Piute Mtns., 10 miles southeast of Bodfish, near south fork of Erskine Cr.	Della Bergner, pres., Jenette-Grant Mining Co., Mechanicsburg, Pennsylvania (1958)	Stibnite with quartz along contact of limestone and schist.	Antimony ore valued at $13,000 mined and shipped in 1918. See under gold (Goodwin 57:529t; Tucker, Sampson, Oakeshott 49:207, 225-226, 261t).

ANTIMONY, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Julius Shades	El Paso Mts.(?)			Uncorrelated old name; probably long abandoned prospect. (Boalich, Castello 18b:11t).
9	Maharg and Hough-awott (Mahary and Houghthawoth group) mine	Reported in sec. 4, T10N, R15W, SBM, 18 miles southwest of Mojave, south-east slope of Tehachapi Mts. (1924); not confirmed, 1958	Undetermined, 1958; Earl Maharg, F. B. Houghawott, Long Beach (1924)	Stibnite occurs in E.-striking, N.-dipping vein at contact between limestone and a porphyritic rock. Lens of ore exposed in shaft in 1924 was 1 to 2 feet wide and reported to contain 20 percent antimony.	Developed by 30-foot shaft in 1924. Probably some production. Long idle. (Tucker 24:367; 29:21; Tucker, Sampson, Oakeshott 49:252t).
10	Mammoth Eureka mine	SE¼ sec. 33, T30S, R34E, MDM, 17 miles east of Cal-iente, on top of ridge on north side of Indian Cr.	Clyde E. Mallacho-witz, 1102 Kern St. Bakersfield (1958)	Stibnite in quartz veins in sili-cified andesitic rocks.	See text. (Boalich, Castello 18b:11t).
	Mojave Antimony mine				See Antimony Consolidated mine (Aubury 04:19t; 06:374; Brown 16:475).
	Old Mill No. 1	Reported in Loraine dist. (1918)	Undetermined, 1958; Mrs. Charles E. Bennett, Piute (1918)	Undetermined.	Uncorrelated old name. May be listed herein under another name. (Boalich, Castello 18b:11t).
11	Padre mine	SW¼ sec. 11, T9N, R21W, SBM, 3 miles northwest of Cuddy Valley, about a mile east of Anti-mony Pk.	Undetermined, 1958; may be part of Big Pine Mining Co. property	Stibnite and other antimony minerals in 15-foot-wide shear zone in granitic rocks. Zone strikes NW. approx. same as south-east part of San Emigdio vein which is half a mile to the west.	Discovered in 1892 and developed by a 25-foot drift in 1893. About 3 tons of high-grade stibnite ore on dump in 1893. Not described since 1896 but claim shown on map by Jermain and Ricker, (1949, fig. 2). Probably some pro-duction; long idle. (Crawford 94:21-22; 96:31; Jermain, Ricker 49:fig. 2).
	Rayo mine	Reported in sec. 36, T26S, R33E, MDM, 6 miles south-east of Isabella (old site); not confirmed, 1957	Undetermined, 1957; Rayo Mining and Dev. Co., Los Angeles (1904)	Three-to 10-foot-wide vein.	Developed by shallow shafts and open cuts prior to 1916. Probably some production; long idle. (Aubury 04:15t, 19t; Brown 16:476; Tucker 29:21; Tucker, Sampson 40b:322).
	San Emidio mine				See San Emigdio mine in text. (Bowers 88:680-681).
12	San Emigdio (Antimony Pk., Bousby, Boushy, Padre) mine	Secs. 9, 10, and 11, T9N, R21W, SBM, high on north slope of Antimony Pk., 8 miles north-west of Frazier Park	Kern County Land Co., 2920 H St., Bakersfield (1958)	Stibnite and oxides of antimony in lenses in shear zone which strikes northwest and dips southwest in granitic rocks.	See text. (Angel 90:225-226; Aubury 04:196; Bowers 88:680-681; Brown 16: 476; Crawford 94:21, 22; 96:31; Jermain, Ricker 49:1-5; Tucker 29:22; Tucker, Sampson, Oakeshott 49:207, 252t).
	Standard	Reported in east fork of Erskine Cr., Piute Mts.; not confirmed, 1957	Undetermined, 1957	Pocket of stibnite-bearing ore at contact between slate and limestone. Ore contained 60 percent antimony by assay.	Fifteen-ton shipment made in 1893. Ore valued at $45 per ton delivered at Caliente, 40 miles from mine. (Craw-ford 94:22).
13	Studhorse Canyon mine	NW¼ sec. 4, T31S, R33E, MDM, Loraine dist., 3 miles south-southwest of Loraine at crest of ridge between Studhorse and Hog Cyns.	Undetermined, 1958; J. R. Stubblefield and R. Ramey, Caliente (1949)	Three-foot-wide brecciated blue-gray quartz vein strikes N. 80° E. and dips 73° NW.; in bleached and highly altered rhyolite dike. Stibnite and yellow antimony oxides in thin streaks and small pods.	Developed by 100-foot crosscut adit to bottom of 40-foot shaft on vein and drift 30 feet N. 80° E. from shaft. Near collar of shaft an 80-foot drift was driven S. 65° E. Several small shipments made to Harshaw Chemical Co., El Segundo. Idle. (Tucker, Sampson, Oakeshott 49:207, 252t).
	Tabasco	Reported in vicin-ity of Garlock (1918); not confirmed, 1958	Undetermined, 1958; Thomas Royal, G. Phillips, Randsburg (1918)		Uncorrelated old name. Probably long abandoned prospect. (Boalich, Castello 18b:11t).
14	Tom Moore	SW¼SW¼ sec. 24, T27S, R33E, MDM, 6¼ miles south-east of Bodfish, ¼ mile east of Erskine Cr. rd., ½ mile southwest of Laura Pk.	Undetermined, 1955; Kern Land and De-velopment Co., Bakersfield (1949)	Aggregates of bladed and massive stibnite and native antimony in quartz vein in shear zone about 5 feet wide. Country rock is phyllite, slate, quartzite, and other metamorphic Carboniferous (?) rocks. Vein is 1 to 2 feet wide, strikes N. 20° W., and dips steeply eastward.	Ten acres patented. Vein mined and prospected for 250 yards along strike by trenches, several shafts 25-feet or less in depth, and several short adits; workings largely caved. By 1893, three and a half tons of metallic (native) antimony which occurred in nodular masses from 1 oz. to 300 pounds in weight had been mined. Some ore reported to contain 65 percent antimony. Idle since 1916. (Boalich, Castello 18b:11t; Brown 16:475, 476; Crawford 94:21; 96:31; Tucker 29:22; Tucker, Sampson 40b:322-323; Tucker, Sampson, Oakeshott 49:252t; Watts 93:237).

ANTIMONY, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
15	Top of the World mine	SE¼ sec. 34 T30S, R32E, MDM, in Devil Canyon, 11 miles east-southeast of Caliente	Undetermined, 1954; Henry G. Hubbard, Eagle Rock (1949)	Kidney-shaped bodies of auriferous stibnite in vein at contact trending NNE. between schist and quartz diorite. Scheelite found at one point.	One patented claim and 3 unpatented claims (1943). Developed by 230-foot adit (partly caved), 10-foot winze near portal of adit, and 25-foot drift at bottom of winze. Production undetermined. Idle. (Jenkins 42:330t; Tucker, Sampson 43:61-62; Tucker, Sampson, Oakeshott 49:252t, 275t).
16	Wiggins mine	Reported in sec. 8, T31S, R33E, MDM, Loraine dist., 4 miles southwest of Loraine at the head of Studhorse Cyn.	Undetermined, 1958; A. B. McAdams and J. M. Wiggins, Mojave (1949)	Three to 4-foot-wide vein in quartz diorite. Principal antimony mineral is stibnite.	Developed by 75-foot adit on vein and a few open cuts. Shipped 62 tons of ore in 1918. Idle. (Tucker, Sampson, Oakeshott 49:207, 252t).

The lenses are as much as several feet in width. Some of them pinch out abruptly within a few feet downward, or narrow to a few inches in width. Stibnite is the principal antimony mineral, but much of it is altered to red, white, and yellow oxides of antimony. In general, the lenses are composed of a matrix of quartz diorite and quartz containing isolated crystals and veinlets of the antimony minerals. The higher-grade ore contains fine-grained stibnite in quartz. Calcite, pyrite, and arsenopyrite are present locally in the wall rocks. The ore commonly contains traces of copper, lead, silver, and gold.

Surface trenching and sampling conducted by Jermain and Ricker in 1940 and 1941 indicated a reserve of between 3,000 and 9,000 tons of metallic antimony available from 19 lenses in the shear zone along a horizontal distance of 2,100 feet and a vertical distance of 800 feet (U. S. Bur. Mines and U. S. Geol. Survey, 1951, Ch. III, p. 9). The 19 lenses have an average length of 80 feet, an average width of 8.5 feet, and contain an average of 2.5 percent of antimony. The highest assay obtained was 30.88 percent of antimony across 1½ feet of a 49-foot trench across the southeast part of the shear zone. Ore mined before 1900 has been variously reported as containing between 30 and 40 percent of antimony, 4 to 16 dollars in gold, and 4 to 16 dollars in silver (Angel, 1890, p. 225-226; Bowers, 1888, p. 681).

When the property was visited by the writers in 1958, most of the mine adits were caved and the sample trenches cut in 1940 and 1941 were indistinct. The dumps were overgrown, and the adits could not be correlated with previous descriptions of them. Apparently five crosscut and drift adits, ranging in length from 45 to 600 feet (Angel 1890, p. 225; Brown, 1916, p. 476; Jermain and Ricker, 1949, p. 5), were the principal workings.

Arsenic

Many of the metal mines in Kern County contain arsenic-bearing minerals, but only the Contact mine 21 miles northwest of Rosamond has yielded arsenic ore. Twenty-seven tons of ore containing 40 percent of arsenic by assay was reported to have been shipped in 1923 (Tucker, 1924, p. 368).

At the Contact mine, arsenopyrite (FeAsS) is found in lenses in metamorphosed shale along a contact between granite and metamorphic rocks. Arsenopyrite is a common gangue mineral in other metal-bearing veins in the county, particularly gold, silver, and antimony.

Asbestos

Two deposits in Kern County are reported to contain asbestos. One, near Jawbone Canyon, is reported (Brown, 1916, p. 476) to contain chrysotile asbestos in serpentine; the other near San Emigdio Canyon, is reported to contain amphibole asbestos in serpentine (Tucker, 1929, p. 63). Neither deposit has any recorded production, nor were the locations confirmed in 1958 by the writers. Previous descriptions of the deposits are summarized in tabulated form below.

ARSENIC

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
17	Contact group	Reported in SW¼ sec. 10, T10N, R15W, SBM, 19 miles northwest of Rosamond in Tylerhorse Cyn. on southeast flank of Tehachapi Mts. (1949); not confirmed, 1958	Undetermined, 1958; B. D. Standeford, Rosamond (1924)	Arsenopyrite and pyrite occur as irregular lenses along western contact of a limestone-schist roof pendant in quartz diorite. Lenses range in width from 6 to 12 inches in the contact zone which strikes E. and dips 80° N.	Consisted of Contact, Music and Taylor Horse claims in 1924. Developed by 50-foot vertical shaft, 20-foot drift to west, and 50-foot drift adit. Reported production in 1923 was 27 tons of ore which contained 40 percent arsenic. An additional 25 tons of ore was mined and hauled to Rosamond in 1924. Idle. (Tucker, Sampson, Oakeshott 49:207, 252t).

ASBESTOS

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	San Emigdio deposit	Reported 3 miles northwest of Cuddy Ranch, west of Frazier Park (1949); not confirmed, 1958	Undetermined, 1958; R. C. Cuddy, Frazier Park (1949)	Described by Tucker (1929, p. 63) as amphibole asbestos in serpentine on a ridge west of San Emigdio Cyn. Asbestos occurs in horizontal planes 6 to 8 inches wide in northwest-striking serpentine.	Three claims developed by short adits and open cuts in 1925. No production; idle. (Tucker 29:63; Tucker, Sampson, Oakeshott 49:276t).
	Sunshine claim	Reported in sec. 7, T30S, R36E, MDM, 23 miles north of Mojave (1916); not confirmed, 1957	Undetermined, 1957; J. H. Durnal, Tehachapi (1912)	Asbestos-bearing rock strikes northeast, dips 40° S. between serpentine walls. Reported to be 10 feet wide and 150 feet long.	Three claims located in 1912; no known activity since. (Brown 16:476).

Barite

The only confirmed barite deposit of potential commercial interest in Kern County is the Ritter Ranch deposit described below. Barite crystals are reported from Pine Canyon north of Mojave (Murdoch and Webb, 1956, p. 69), and in El Paso Mountains, but these reports were not confirmed.

Barite veins in the limestone roof pendants at the Ritter Ranch deposit and at the Paso-Baryite deposit near the Kern-Tulare County border (Goodwin, 1958, p. 372) suggest the possible existence of other similar deposits in the southern Sierra Nevada batholith.

*Ritter Ranch Barite (Iron Blossom) Deposit.** Location: SW¼ sec. 4, T. 31 S., R 33 E., M.D.M., Loraine district, 3 miles south of Loraine on a narrow ridge between Studhorse and Hog Canyons. Ownership: The deposit is on the Ritter ranch, owned by E. M. Ritter, Caliente. Rex E. Thomson, 2067 236th St., Torrance, Sim Bramlett, and Ray Johnson leased the deposit from Mr. Ritter in 1958 and subleased it to Baroid Division of National Lead Co., Houston, Texas.

The Ritter Ranch barite deposit was discovered in 1932 by E. C. Stirling of Lone Pine. It had been previously worked as a gold prospect. No barite has been produced from the deposit, but it was being developed in mid-1959.

Bluish-white, very fine-grained barite crops out as two irregular exposures about 250 feet apart on opposite sides of a north-trending ridge underlain by coarsely-crystalline, gray to white dolomitic limestone. The limestone is part of a large north-northeast-trending roof pendant in Mesozoic granitic rocks. Barite in the eastern exposure is about 150 feet downslope from the crest of the ridge. It lies in layers parallel to northwest-trending fractures and bottoms against fractures that trend N. 10° W. and dips 25° SW. The eastern mass is from 75 to 100 feet in length, breadth, and height and it contains interlayers of limestone that trend northwest. The western outcrop, in the steep cliff on the west face of the ridge, was not observed by the writers. Some of the layers of nearly pure barite in the eastern mass are as much as 10 feet wide; the thickest layer of limestone is 10 feet. Barite samples consisting of 97.08 $BaSO_4$ and having a specific gravity of 4.39 were obtained from the deposit by the lessees.

Trenching and drilling in the limestone a few tens of feet upslope from the eastern exposure since September 1958 have revealed the presence of barite a few feet beneath the surface at a point between the two outcrops. If the two exposures of barite are the ends of a continuous body of barite, then the body probably contains as much as several tens of thousands tons of barite.

Development consists of several shallow open cuts across the eastern exposures of barite, a 30-foot drift adit driven northwest in granitic rocks from a point about 50 feet downslope from the open cuts, and a shorter northwest-driven drift adit about 30 feet downslope from the open cuts and 50 feet south of the 30-foot adit. The prospect adits were driven in the search for gold. Since September 1958, benches have been cut upslope from the eastern barite body and access roads have been made.

* Part of this information provided by G. K. Williams, Consulting Geologist, Santa Ana, California.

BARITE

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Iron Blossom				Name of claims on Ritter Ranch deposit in 1932. See Ritter Ranch in text.
18	Ritter Ranch (Iron Blossom)	SW¼ sec. 4, T31S, R33E, MDM, Loraine dist., 3 miles south of Loraine	Earl M. Ritter, Caliente (1958)	Barite in white limestone.	See text.

Bismuth

Bismuthinite (Bi_2S_3) is one of the metallic minerals in the gold-quartz veins at the Big Blue mine near Kernville. Prout (1940, p. 412-413) estimates that the ore recovered at the Big Blue mine has contained 1 to 2 percent metallic sulfides and that bismuthinite comprises about 0.7 percent of the sulfides. It has probably not been recovered as a byproduct. No other occurrences of bismuth have been reported in Kern County.

Bituminous Diatomite (See Diatomaceous Earth)

Borates

By William E. Ver Planck

In recent years, bedded deposits of the sodium borate minerals—borax and kernite—in the Kramer borate district, Kern County, together with the sodium borate-bearing brines of Searles Lake, San Bernardino County, have supplied 95 percent of the world's requirements of boron compounds. Prior to the first production of borates from the Kramer deposits in 1927, borates in the United States were obtained from deposits of the calcium borate mineral colemanite associated with folded Tertiary lake bed sediments and volcanic rocks. In 1925, a small quantity of colemanite was obtained from an outlying part of the Kramer district; and about 1917 prospecting for colemanite was carried out in Cuddy Canyon, north of the Frazier Mountain colemanite district of Ventura County (Gale, 1914b, p. 455, 456). A small amount of colemanite is still produced annually from California sources for purposes in which colemanite is used as such; but because of the higher cost of mining and treatment it cannot compete with sodium borate minerals and brines as a source of borax. Still earlier, from 1872 to about 1900, borax was obtained from the efflorescent crusts of certain playas including Koehn Lake in Kern County. These crusts contain 5 percent or less B_2O_3 in the form of borax and the sodium-calcium borate mineral ulexite mixed with various proportions of other saline minerals and insoluble matter.

At the Kramer borate district (fig. 25), in which lie the mines and plants described below, borate minerals are found in a buried, tabular mass estimated to be 1½ to 2 miles long, half a mile wide, and more than 200 feet in maximum thickness (Gale, 1946). The geology and history of the Kramer borate district are described in the Mining District section.

Boron Operations, United States Borax & Chemical Corporation

Location: East-central portion T. 11 N., R. 8 E., S.B.M. north and west of Boron. Owner and operator: United States Borax & Chemical Corporation, 630 Shatto Place, Los Angeles.

The United States Borax & Chemical Corporation, an American Corporation, was formed in 1956 with the merging of United States Potash Company into Pacific Coast Borax Company. Borax Consolidated, Limited, was formerly the parent company of Pacific Coast Borax Company.

*Baker Mine.** Location: near common corner of secs. 13 and 24, T. 11 N., R. 8 W., S.B.M., and secs. 18 and 19, T. 11 N., R. 7 W., S.B.M., about 3 miles north of Boron and near the eastern limits of the sodium borate body.

The Baker mine yielded a substantial proportion of the borates produced in the Kramer area from 1927 until 1935 when the Suckow mine was taken over by Pacific Coast Borax Company and subsequently known as the West Baker mine. Borax production from the Baker and West Baker mines continued until the early 1950s when production from the Jenifer mine, which was opened in 1951, ultimately supplanted them. The mine has been idle since, but large reserves undoubtedly remain in the Baker mine area. According to Gale (1946, p. 369), the sodium borate body in the Baker mine is in the form of a broad, flat-topped anticlinal nose that plunges southeast. The mine was developed by three vertical shafts of which the main or No. 2 shaft is in the northwest corner of section 19, close to the point where the sodium borate body is thickest in this area. The log of this shaft follows (Gale, 1946, p. 370):

0-375 feet:	Alluvial sediments; shale in lower part
375-393 feet:	Blue shale with colemanite and ulexite
393-498 feet:	Crystalline kernite and borax; some interstratified shale
498-540 feet:	Brownish gray shale with small amount of ulexite in upper part.

Both borax and kernite are present in large masses. Because the two minerals required different processing treatment, they were mined separately. The main shaft had three compartments, two of which had cages for handling men and materials and skips for hoisting ore below them. The main mining level was at 485 feet, and where the ore body dips below this level, it was developed by winzes.

In a considerable area near the main shaft, where the ore body is flat, it was mined by shrinkage stopes separated by pillars. The completed stopes were 20 feet wide, more than 100 feet long, and as much as 100 feet high. In 1951 borax was being mined at some distance from the main shaft where the borate body dips at an estimated 15° southwest. The area was reached by a main winze sunk close to the footwall at an inclination of 9°. Entries parallel to the strike of the borate body were driven in both directions from the winze, and from the entries stopes were started both up dip and down dip. Blast holes 10 feet long were drilled with post-mounted electric-powered augers. Each crew drilled two entry faces or the equivalent in the stopes per shift. The blast holes were detonated by cap and fuse.

After blasting, stopes and entries were mucked with hoe-type scrapers operated by track-mounted three-drum electric hoists powered by alternating current. By means of loading-slides, the scrapers loaded the broken ore into cars of 2¾ tons capacity that were trammed to the winze by locomotives powered by storage battery. Each entry

* Plant visited by writer May 1951.

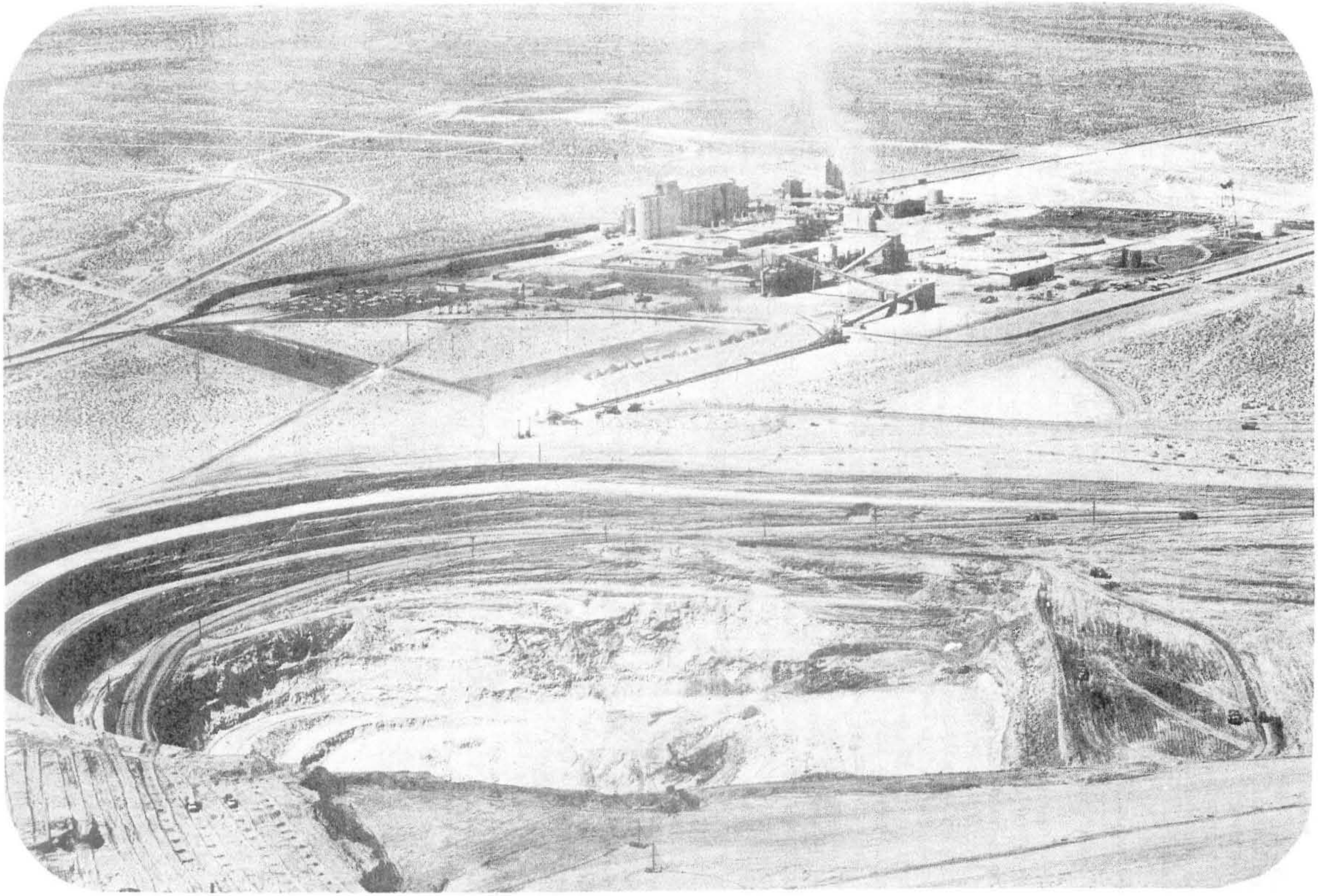


Figure 27. View to southwest of the Boron pit and new boron processing plant of the U. S. Borax & Chemical Corp., Boron. After overburden is removed (center foreground), borate-bearing material is hauled in trucks to storage piles (center) then transferred to plant. The pit was 275 feet deep and 2,000 feet long in May 1959. Pale material in floor and distant wall of pit is borate-bearing material. *(Courtesy United States Borax & Chemical Corporation.)*

track joined the winze track with a switch, allowing a dummy winze car operated by a single-drum hoist above the main haulage level to enter the entry mouth. Ore cars were coupled to the dummy car, raised to the haulage level, and emptied into a transfer chute. Storage battery locomotives then took the ore in 4-ton cable bottom cars to a loading pocket at the main shaft.

To prevent subsidence, completed stopes were filled with sand introduced from the surface through large diameter drill holes. The connections to the entries were closed with heavily braced timber bulkheads. The sand was distributed and packed tightly in the stopes by means of high speed horizontal sand wheels fitted to chutes at the bottoms of the drill holes.

*Boron Mine.** Location: NE¼ sec. 23, T. 11 N., R. 8 W., S.B.M., about 4 miles northwest of Boron near the western limits of the sodium borate body. The Boron mine is the name given to the open pit (fig. 27), which was formally opened in November 1957, and which since that time has been the only mine in operation in the Boron area. Stripping of overburden, which was done by the Isbell Construction Company of Reno, Nevada, began in January 1956. Approximately 9 million tons of overburden was removed, forming a pit 1,500 to 2,000 feet in diameter at the top. The upper surface of the sodium borate body was reached at 137 feet in May 1957, and in the following month limited production began.

In the open pit area the sodium borate body consists of borax with some kernite. It is overlain by greenish shale, which in turn is overlain by sand and comparatively fine gravel that contains sparsely distributed cobbles and layers cemented by calcite.

The overburden is first loosened with a scarifier pulled by a Caterpillar D9 tractor. The calcite-cemented layers occasionally encountered are drilled and blasted. Rubber-tired scrapers of 24 yards struck capacity, assisted by Caterpillar D9 tractors, excavate the material.

Some of the overburden has been used for the construction of diversion dikes to protect the pit from flash floods. Benches, which are at 50-foot intervals in both overburden and ore, are connected with an access road having a maximum grade of 7 percent. All haulage roads are 50 to 60 feet wide. The overall pit slope is 1.4 to 1.

In mining the borax that has been uncovered, vertical blast holes are bored with McCarthy auger drills. The holes are loaded with ammonium nitrate-base explosive and detonated by primacord and fuse. Bucyrus-Erie 54-B electric shovels equipped with 3-cubic-yard buckets load the broken ore into 24-ton rear-dump trucks that haul it out of the pit to the primary crusher. When the pit has been sufficiently enlarged in the course of mining, the company plans to move the primary crusher to the floor of the pit, and to transport the crusher product to the surface with a belt conveyor.

* Information obtained partly from a description by Wamsley (1957); plant visited by writer October 1956.

*Jenifer Mine**. Location: NE¼ sec. 23, T. 11 N., R. 8 W., S.B.M., about 3½ miles northwest of Boron in the western part of the sodium borate body. This underground mine was worked continuously from 1951 to 1957 and was probably the largest underground operation in California at that time. High output per man-shift and low unit costs were achieved through the use of continuous mining machines.

In the Jenifer mine the sodium borate body consists of three borax beds separated by 30 to 40 feet of low-grade, borax-bearing shale. These beds dip at generally low angles but locally as much as 15°. The main Jenifer shaft was constructed by enlarging a 20-inch bore hole that connected with a drift extended from the West Baker mine workings. A service shaft was located about 350 feet from the main shaft. The main level was at a depth of about 370 feet. The deeper portions of the mine were reached from the main winze, sunk 1,100 feet on a 20 percent grade from the vicinity of the two shafts.

Mining was by a modified room and pillar method with 22-foot by 27-foot pillars oriented so that haulage paralleled the strike of the beds as closely as possible. A double-entry system was used with the fresh air course on the right and break-throughs at 100-foot intervals. Each borax bed was mined separately, leaving the low-grade material between the beds as horizontal pillars. Where stoping was carried out in two or more beds in the same area, the vertical pillars were superimposed.

* Information obtained partly from a description by Dayton (1957); plant visited by writer October 1956.

*Table 4. Physical properties of rocks from the Jenifer mine.**

Group no.	Apparent specific gravity	Compressive strength (lbs./sq. in.) × 1000	Modulus of rupture (lbs./sq. in.) × 1000	Young's modulus (lbs./sq. in.) × 10^6	Poisson's ratio
68[1]	2.14	6.4	0.4	0.61–1.69	--------
68[2]	1.74	1.1	0.1	0.94–2.08	0.26–0.42
68[3]	1.72	3.3	0.3	1.52–2.06	0.20

* Blair, 1956, p. 7, 51-52.
[1] Borax-clay mixture from below lower ore.
[2] Clear borax with thick coating of tincalconite from upper part of middle ore.
[3] Powdery tincalconite with borax and clay from lower part of upper ore.

Artificial support of the mine workings was not required except that roof bolts were used to hold up loose slabs.

All mining was done with Joy continuous mining machines which cut and loaded the ore in one operation. These machines, mounted on caterpillar tracks, had 440-volt alternating current motors and hydraulic controls. A cutting head in the front, that could be swung about both the vertical and horizontal axes, carried parallel chains fitted with many closely spaced tungsten-carbide-tipped teeth. In operation, the machine was crowded against the face; and as the cutter was raised, the teeth ripped borax from the wall. These machines made a heading 17 feet wide and 8 feet high; in thick ore as many as three cuts were taken, the uppermost first. About 20,000 cubic feet of free air per minute were directed past the cutting head to pick up the dust formed and carry it into the return air course.

Each mining machine was served by two Joy shuttle cars of 8 tons capacity that had four-wheeled steering and 250-volt direct-current motors supplied by trailing cables. They were unloaded by means of chain flight conveyors in the bottom. One shuttle car stayed at the mining machine to serve as a temporary storage and surge bin, allowing the mining machine to operate continuously. The other shuttle car carried the broken ore a maximum of 500 to 600 feet to a transfer point. Ore from the upper workings was dropped by means of ore passes to a belt conveyor in an entry at a lower level, while shuttle cars in the lower workings discharged onto entry conveyors. All broken ore was delivered to the main winze, which was equipped with a skip for handling men and materials and a belt conveyor for raising the ore to a bin near the shaft bottom. The winze conveyor, which was 30 inches wide, was driven by a 100-horsepower motor and had a capacity of 350 tons per hour. The ore, after being reduced to minus 4 inches with a Pennsylvania single roll, toothed crusher, was automatically loaded into skips of approximately 5 tons capacity. The skips, which were in balance, were raised at the rate of 1,200 feet per minute by a two-drum Nordberg hoist powered by a 500-horsepower motor. The hoist drums measured 52 inches in width and 7 feet in diameter.

West Baker Mine. Location: SE¼ sec. 14, T. 11 N., R. 8 W., S.B.M., about 4 miles northwest of Boron and in the western part of the sodium borate body. The West Baker mine, then called the Suckow mine, was opened in 1929 by Dr. Suckow and was operated on a large scale from 1935, when the operation was taken over by Pacific Coast Borax Company, until 1953.

In the West Baker mine, three borax beds totalling about 100 feet in thickness are separated by borax-bearing shale which was not mined. Borax is the only sodium borate mineral that has been reported. The borax and shale beds dip 6° to 8° N.E. The following is the log of the No. 1 shaft, located 750 feet east and 80 feet north of the south quarter corner of section 14 (Gale, 1946, p. 360, fig. 3):

0-185 feet:	Unconsolidated alluvial sediments
185-200 feet:	Arkosic sandstone
200-240 feet:	Red clay
240-290 feet:	Green shale
290-331 feet:	Blue and green shale with nodules of colemanite and ulexite
331-338 feet:	Crystalline borax
338-347.5 feet:	Blue clay
347.5-384 feet:	Crystalline borax with minor bands of hard shale
384-405 feet:	Hard shale with seams of borax and ulexite
405-417 feet:	Crystalline borax
417-431 feet:	Hard shale with some borax and ulexite.

The mine was worked through a main three-compartment shaft 225 feet north of the No. 1 shaft. The main level was at 380 feet, and the parts of the mine that were deeper than this level were reached by an inclined winze.

*Boron Concentrator-Refinery.** Location: sec. 23, T. 11 N., R. 8 W., S.B.M., west of the Boron mine. The concentrator-refinery was constructed to process the ore from the Boron open pit. It combines the functions of the Boron mill which produced borate concentrates by a dry process, and of a large part of the refinery at Wilmington, Los Angeles County, which produced refined borax, boric acid, and specialty products. The new plant, which went into production late in 1957, was designed to use ore of lower grade than could be handled previously, and it eliminates freight charges on the unprocessed ore that was formerly shipped to Wilmington for refining. The production of refined borax at Wilmington has been discontinued, but boric acid and specialty products are still made there.

In the new refinery the process consists of dissolving the soluble fractions of the ore in water, removing the insoluble matter, and recovering borax by crystallization. Ore is trucked from the open pit to a primary crusher of the hammer-mill type that reduces it to minus 4 inches. A travelling stacker blends and stacks the coarse ore in a pile of 60,000 tons capacity over a reclaiming tunnel. The ore is then crushed to ¾-inch with an impact-type crusher in closed circuit with vibrating screens. Four elevated tanks provide storage for 4,000 tons of fine ore. The tanks are continuously sampled in order that the correct proportion can be drawn from each and blended to furnish uniform feed for the dissolving plant. At the dissolving plant, the ore is mixed with process end liquors and agitated in a series of tanks heated with steam. The borate minerals dissolve, and the larger fragments of insoluble matter are removed with a vibrating screen. The strong borax liquor goes to four thickeners 230 feet in diameter, where most of the suspended solids are removed. Because the liquor must be kept hot, the thickeners are insulated and provided with steel covers. The presence of the covers requires that the revolving blades be driven from the center instead of from the periphery. These are believed to be the largest center-drive thick-

* Information obtained partly from a report by Dayton (1958, p. 47-49); plant visited by the writer October 1956.

eners ever constructed. The insoluble sludge and the waste removed by screening are pumped to a tailings pond west of the plant.

The overflow liquors from the thickeners are pumped to the granulating plant, which contains filters, crystallizers, centrifuges, and final product driers. Here the different grades of sodium tetraborate decahydrate (borax) and sodium tetraborate pentahydrate are produced.

In the anhydrous borax plant, granulated borax is calcined in rotary kilns to remove part of the water of crystallization and then completely dehydrated by melting in furnaces. The fused borax, after flowing from the furnaces, is cooled, crushed, and screened to specifications.

*Boron Mill.** Location: northwest corner sec. 19, T. 11 N., R. 7 W., S.B.M., adjacent to the main shaft of the Baker mine. A considerable part of the ore from the Baker, Jenifer, and West Baker mines was processed in the Boron mill and required no further treatment; the rest of the crude ore was shipped to the refinery at Wilmington, where refined borax, boric acid, and specialty products including Boraxo were made. When the Boron concentrator-refinery came into full production late in 1957, the Boron mill was closed.

Because borax and kernite have very different physical properties, separate methods were required for treating them. In 1951, both the mill and the refinery were equipped to treat borax only, and no kernite was mined. The milling process consisted of magnetic separation to remove part of the slightly magnetic shale from the ore, followed by calcination to remove water of crystallization. Ore was first reduced and sized with hammer mills and rolls in closed circuit with Tyler hummer screens. The plus 35 mesh material then passed through a large number of high intensity Exolon magnetic separators of the induced-roll type that reduced the shale content of the ore to 4 or 5 percent. Magnetic separation was not applicable to the minus 35 mesh material, which was not treated in the dry mill.

Some of the concentrate from the magnetic machines was sold, but most of it was calcined to pentahydrate borate ($Na_2B_4O_7.5H_2O$) in direct-fired, countercurrent, rotary calciners. Much of the pentahydrate borate was sold for industrial and agricultural use. A product known as Rasorite Anhydrous was made by the fusing of concentrates in furnaces. The resulting glass-like product was chilled, crushed, and ground. All dust-producing machines in the mill were enclosed. The dust was collected with a vacuum system and brought to a small plant where borax was recovered from it.

During World War II a boric acid plant was constructed at Boron. Here fines from the mill were dissolved in hot process end liquor and treated in Dorr thickeners to remove insoluble matter. The clear borax liquor was then reacted with sulfuric acid, and boric acid crystals that formed were recovered.

* Plant visited by the writer May 1951 and October 1956.

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Other Operations

*Mudd (Western) Mine.** Location: Near center of sec. 24, T. 11 N., R. 8 W., S.B.M., approximately 3 miles northwest of Boron and on the south edge of the sodium borate body. Ownership: Seeley G. Mudd, Henry T. Mudd, Caryl M. Sprague, and George D. Dub, 523 W. 6th St., Los Angeles 14, own the former Western mine property in the S½ sec. 24, and leases from the Federal Government the 10-acre Little Placer in SW¼ SW¼ NE¼ sec. 24. The mine was developed by the Western Borax Company which produced 160,000 tons of sodium borates, mostly kernite, from 1927 to 1933 (Gale, 1946, p. 369). In 1954 the owners obtained a Federal lease on the adjoining Little Placer. This group has been exploring and developing the sodium borate body in the Little Placer from the old Western mine workings; but by mid-1959, production had not been achieved.

The holdings contain a small part of the south margin of the sodium borate body. The old Western Borax Company property, the south half of section 24, lies south of the sodium borate body except for a strip approximately 2,500 feet long and 200 to 300 feet wide (Gale, 1946, plate 52). Little Placer, so far as is known, is entirely within the sodium borate body.

In the Mudd mine the ore forms a massive bed of sodium borate minerals 50 to 100 feet thick at an average depth of 1,000 feet beneath the surface. Crumpled shale containing scattered crystals and seams of the sodium calcium borate minerals, probertite and ulexite—enclose the sodium borate bed, and the shale in turn is enclosed in water-bearing granitic sand and conglomerate. The basalt present at depth elsewhere in the Kramer basin has not been found in the Mudd mine. The borate bed and the enclosing shale have been folded into an anticline, the axis of which plunges 10° to 15° northeast. The beds dip gently northeast except in the western part of the old mine workings where north and northwest dips were observed. To the south the borate bed lenses out abruptly.

The sodium borate bed consists mostly of kernite, but borax forms an envelope 10 to 25 feet thick around the kernite. The contact between the kernite and the borax is gradational; and in the contact zone, masses of kernite have borax rims. In some areas the borate bed is nearly pure kernite, but in other areas it contains as much as 25 percent shale in layers half an inch thick. Much of the kernite is in transparent crystal masses 6 inches to 2 feet long, but some of it is dark because of a small amount of included matter. Some ore that is rich in kernite consists of comparatively small crystals of kernite surrounded by clay films.

Openings in the sodium borate body require no artificial support, but openings in the associated shale and sand require comparatively heavy timbering. Although the sand is water-bearing, the shale that encloses the borate body is impervious and keeps water away from the area. Any water that finds its way into the workings in

* Information obtained partly from an article in Mining World (1955); plant visited by writer March 1957.

BORATES

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
19	Baker mine	NW. cor. sec. 19, T11N, R7W, SBM, Kramer borate dist., 3 miles north of Boron (main shaft)	Undetermined, 1958		See Boron operations in text. (Gale 46:369; Schaller 36b; Tucker, Sampson, Oakeshott 49:243).
20	Balling I	SE. cor. sec. 24, T11N, R9W, SBM, Kramer borate dist., 7 miles west-northwest of Boron		Two boreholes, 1,138 and 1,400 feet deep. Encountered lake beds but no borates.	Prospected by W. M. Balling and Associates, 1940 (Gale 46:375).
21	Balling II	NE¼SE¼ sec. 18, T11N, R7W, SBM, Kramer borate dist., 3½ miles north of Boron	Undetermined, 1958	Three boreholes. No. 1 encountered gravel only. No. 2 encountered colemanite-bearing shale, 254-290 feet, basalt at 299 feet. No. 3 encountered colemanite-bearing shale, 443-462 feet.	Prospected by W. M. Balling. (Gale 46:373).
22	Marshall Bond	SE¼ sec. 19, T11N, R8W, SBM, Kramer borate dist., 6½ miles west-northwest of Boron	Undetermined, 1958	Borehole; total depth 1063 feet. Encountered unconsolidated sand and gravel, 0-576 feet; clayey, blue-green sediments, 576-711 feet; black basalt, 711-753 feet; brownish sandy shales and sands, 753-875 feet; greenish-gray tuffaceous beds, 875-930 feet; white to greenish tuff, 930-983 feet; greenish to gray shale containing tuff and grading into scoriaceous basalt, 983-1043 feet; black basalt.	Prospected in 1940. (Gale 46:339, 375).
23	Boron open pit	NE¼ sec. 23, T11N, R8W, SBM, Kramer borate dist., 4 miles northwest of Boron			See Boron operations in text. (Wamsley 57:60-62).
	Boron operations (Baker, Boron open pit, Jenifer Pacific Coast Borax Co., Suckow mine, West Baker)	Sec. 17, SW¼ sec. 18, S½SE¼ sec. 18, S½S½N½SE¼ sec. 18, sec. 19, NW¼ sec. 20, T11N, R7W, SW¼ sec. 2, SE¼ sec. 3, secs. 11, 13, 14, 15, 16, 21, 23, N½ sec. 24 (except SW¼SW¼), NE¼ sec. 27, T11N, R8W, SBM, Kramer borate dist., 3 miles north-northwest of Boron	United States Borax & Chemical Corp., Pacific Coast Borax Co. Division, 630 Shatto Place, Los Angeles 5 (1958)		See text. (Gale 46; Mead 33; Pacific Coast Borax Co. 51; Schaller 29; 36; 36b; Tucker 29:77; Tucker, Sampson, Oakeshott 49:241; Wamsley 57:60-62).
	Buckhorn Springs deposit	T9N, R9W, SBM, near south end of Rogers Dry Lake, 25 miles southeast of Mojave	Undetermined, 1958	Borates reported in efflorescent crust.	(Bailey 02:50; Brown 16:477).
24	Stuart Chevalier	SW¼ sec. 35, T31S, R40E, MDM, 6 miles south of Randsburg	Undetermined, 1958	Borehole 1750 feet deep; cored below 735 feet. Encountered mixed volcanic sediments and decomposed granitic materials. In detail: light chocolate-brown sandstone and white ashy beds, 700-1000 feet; tile-red sandstone, grayish in places, including some greenish-gray tuff-like clay mixed with arkose or gritty sands of various colors, 1000-1260 feet; gray clay, arkosic beds, volcanic breccia, 1260-1750 feet.	(Gale 46:373).
25	China Lake (Teagle-Churchhill Potash Co.) deposit	T25S, R40E, and T25S, R41E, MDM, 8 miles north of Ridgecrest. Partly in San Bernardino County	China Lake Naval Ordnance Test Station (1958)	Playa with borate-bearing efflorescent crust.	Probably some production before 1895. In 1911 Teagle-Churchill Potash Co. located 5,792 acres and planned to produce borax and potash from brine pumped from wells. (Bailey 02:50; Brown 16:477; Gale 15:269).
26	Cotton Ball (Desert Springs, Kane Springs, Koehn Lake) deposit	Sec. 8, T30S, R38E, MDM, east end of Koehn Lake, near Gypsite	Estate of A. D. Daly, Lancaster (1958)	Ulexite cotton balls 1 to 3 inches in diameter in efflorescent crust of Koehn Lake.	Discovered 1873 by H. G. Lent. Probably some production before 1890. About 3 carloads hand picked and shipped by C. A. Koehn, 1898-1929. (Bailey 02:50; Brown 16:477; Dibblee, Gay 52:45-46, 55t; Hanks 83, pt. 2:29).
27	Cuddy Canyon prospect	Secs. 34, 35, T9N, R20W, SBM, on south side of Cuddy Cyn., 2 miles west of Frazier Park	Undetermined, 1958	Gypsiferous-shale associated with basalt. Similar to the colemanite-bearing beds in the Frazier Mt. borate district, Ventura County.	Prospected with pits and shafts. No record of production. See also under Gypsum. (Gale 14:455).
	Desert Springs				See Cotton Ball (Hanks 83, pt. 2:29).

BORATES, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	El Paso Wells prospect	Reported in T28S, R40E, MDM, 12 miles north of Randsburg (1902); not confirmed, 1958	Undetermined, 1958	Borates reported in efflorescent crust.	(Bailey 02:51).
28	Four Corners 2	Near N½ cor. sec. 5, T10N, R8W, SBM, south of Kramer borate dist., 5½ miles west of Boron	Edwards Air Force Base (1958)	Borehole. Encountered sand, 0-100 feet; clay and silt, 100-536 feet; fine to coarse sand, silt and clay, some pebble gravel, 536-1202 feet; gravel of granitic and volcanic material, sand and silt, 1202-1679 feet; greenish gray arkosic sand, minor silt and clay with dip 15°-20°, 1679-1913 feet; sand, some granitic cobbles, 1913-2328 feet. No borates or lake beds found.	Drilled in 1955 and deepened in 1957 by U. S. Geol. Survey (Benda, Erd, Smith 57; Dickey 57).
	Indian Springs prospect	Reported in T26S, R38E, MDM, west side of Indian Wells Valley (formerly Salt Wells Valley), 3 miles northwest of Inyokern (1916); not confirmed, 1958	Undetermined, 1958	Borates reported in efflorescent crust.	Bailey 02:50; Brown 16:477).
29	Jenifer mine	Main shaft near east edge NE¼ sec. 23, T11N, R8W, SBM, Kramer borate dist., 3½ miles northwest of Boron			See Boron operations in text. (Dayton 57).
	Kane Springs				See Cotton Ball (Bailey 02:50; Brown 16; 477).
	Koehn Lake				See Cotton Ball.
30	Kohler	NE¼ sec. 20, T11N, R8W, SBM, Kramer borate dist., 5½ miles west-northwest of Boron	Undetermined, 1958	Three boreholes in a SE. line, 500 feet apart. Top of Saddleback basalt found in No. 1 at 257 feet; in No. 2 at 335 feet; in No. 3 at 240 feet. Lake beds overlie the basalt. No borates found.	Prospected in 1924 and 1925. (Gale 26:457; 46:374).
31	Leopold	Sec. 24, T11N, R9W, SBM, Kramer borate dist. 8 miles west northwest of Boron	Undetermined, 1958	Two boreholes. No. 1 encountered basaltic mud with a few specks of ulexite, 693-702 feet; total depth 900 feet. No. 2 encountered sands with interbedded shale, 0-625 feet; bluish bentonitic clay and some sand, 625-678 feet, with sample containing 1.75 percent B_2O_3 at 640 feet; hard basaltic lava, 679-692 feet; chiefly sands, 692-955 feet. Total depth, 955 feet. No sodium borates found.	Prospected in 1935 and 1936. Additional test boring in 1945 and 1946 by Victory Associates, Los Angeles. (Gale 46:374).
	Little Placer claim				See Mudd mine in text.
32	McGinty	Sec. 8, T11N, R7W, secs. 1, 12, T11N, R8W, SBM, Kramer borate dist., 4 miles north of Boron	Joseph McGinty (1955)	Five to 10 boreholes. Encountered 500 to 600 feet of unconsolidated sand and gravel underlain by the Saddleback basalt. No borates found.	(Gale 46:373).
33	Mudd (Little Placer, Western) mine	Main shaft near center sec. 24, T11N, R8W, SBM, Kramer borate dist. 2½ miles northwest of Boron			See text. (Gale 46:363; Schaller 36b; Tucker 29:80).
34	Pacific Alkali Co.	NE¼ sec. 18, T11N, R7W, SBM, Kramer borate dist. 3½ miles north of Boron	Arthur S. Crites, et al. (1955)	Two boreholes; total depths 855 feet and 940 feet. Encountered gravel-bearing alluvial sediments overlying thin-bedded, pinkish limestone, tuffaceous silt, and clay. No borates found.	(Gale 46:373).
	Pacific Coast Borax Co. holdings				See Boron operations in text. (Tucker 29:77).
35	Russell I	NE corner sec. 21, T11N, R8W, SBM, Kramer borate dist. 5 miles northwest of Boron	U. S. Borax & Chemical Corp., 630 Shatto Place, Los Angeles 5 (1958)	Borehole. Encountered green shale at 120 feet; showing of colemanite, 160-180 feet.	An early test boring. (Gale 26:457).

BORATES, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
36	Russell II	NE¼ sec. 18, N½NW¼ sec. 18, E½SE¼NW¼ sec. 18, T11N, R7W, SBM, Kramer borate dist. 4 miles north of Boron	Arthur S. Crites et al. (1955)	At least 7 boreholes. Encountered colemanite-bearing lake beds.	(Gale 46:372).
37	Slosser shaft	Near center NE¼ sec. 22, T11N, R8W, SBM, Kramer borate dist. 4 miles northwest of Boron	U. S. Borax & Chemical Corp., 630 Shatto Place, Los Angeles 5, (1958)	Prospect shaft. Encountered calcium borate minerals in a bed 10 to 14 feet thick at 110 feet and resting on vesicular basalt.	Early prospect of Pacific Coast Borax Co. (Gale 26:456; Noble 26).
38	Suckow colemanite mine (Suckow shaft No. 2)	South edge NE¼ sec. 22, T11N, R8W, SBM, Kramer borate dist., 4 miles northwest of Boron	U. S. Borax and Chemical Corp., 630 Shatto Place, Los Angeles (1958)	Log of shaft: Sand, gravel, and boulders, 0-105 feet; "green" shale, 105-170 feet; arkosic sandstone and conglomerate, 170-210 feet; dark shale with lenses and masses of colemanite, 210-280 feet; basalt, 280-310 feet. Total depth, 330 feet.	Shaft sunk by J. K. Suckow, 1924. A small production of colemanite, 1925. (Gale 26:457; 46:371; Noble 26; Schaller 36b).
39	Suckow discovery well and shaft	Near center NW¼ sec. 22, T11N, R8W, SBM, Kramer borate dist., 4½ miles northwest of Boron	U. S. Borax & Chemical Corp., 630 Shatto Place, Los Angeles 5 (1958)	Partial log of well: dark putty-like clay, 190-331 feet; blue shale, 331-369 feet; colemanite, 369-410 feet; blue shale, 410-435 feet; "gypsum", 435-445 feet; rock formation (basalt), 445-450 feet. Shaft encountered "green shale." Depth of shaft, 200 feet.	Colemanite discovered October 1913 in water well sunk by J. K. Suckow. Shaft sunk near by did not reach the borate-bearing horizon. (Gale 26:453; 46:371; Noble 26).
	Suckow mine				See Boron operations in text. Called West Baker mine 1935 and after. (Gale 46:361; Mead 33; Schaller 36b; Tucker 29:79).
	Suckow shaft No. 1	Near center NE¼ sec. 22, T11N, R8W, SBM, Kramer borate dist., 4 miles northwest of Boron	U. S. Borax and Chemical Corp., 630 Shatto Place, Los Angeles 5, (1958)	Encountered basalt at 180 feet. No borates found.	Prospect shaft sunk 1924 by J. K. Suckow. (Gale 26:457; Noble 26).
	Suckow shaft No. 2				See Suckow colemanite mine. (Gale 26:457; Noble 26; Schaller 36b).
	Teagle-Churchill Potash Co.				See China Lake (Brown 16:477).
	Ulexite shaft	NE¼ sec. 22, T11N, R8W, SBM, Kramer borate dist., 4 miles northwest of Boron	U. S. Borax & Chemical Corp., 630 Shatto Place, Los Angeles 5 (1958)	Encountered ulexite at 110 feet. Total depth, 120 feet. A nearby borehole encountered basalt at 190 feet.	Early prospect of Pacific Coast Borax Co. (Gale 26:456; Noble 26).
40	West Baker mine	Main shaft in SW¼ SE¼ sec. 14, T11N, R8W, SBM, Kramer borate dist., 3½ miles northwest of Boron			See Boron operations. Called Suckow mine before 1935. (Tucker, Sampson, Oakeshott 49:244).
	Western mine				See Mudd mine in text. (Gale 46:363; Schaller 36b; Tucker 29:80).

the borate body is likely to soften the shale and contribute to caving.

Most of the old Western Borax Company workings (Gale, 1946, plate 55) were driven from the No. 1 shaft, which was sunk south of the borate body. A single station was established at a depth of 856 feet from which a crosscut extends northeast through the gently northeast-dipping footwall of the borate body and almost to the north boundary of the property. The workings driven east and west from this crosscut comprise B level. The workings above B level are called A level and are connected with B level by a number of raises. Both east and west of the crosscut, the footwall gradually passes below B level and is followed by winzes. No. 3 winze was driven eastward about 650 feet, and at its east end it is 110 feet below B level. C level, at 900 feet below the surface, and D level, at 952 feet are lower levels that connect with No. 3 winze. D level is connected by a long crosscut with No. 3 shaft, which the Western Borax Company used as an auxiliary shaft. Ore was removed by open stoping, and casual pillars were left for support. About 50 percent recovery was realized. When the owners reopened the mine, most of the old workings were in good condition except that some of the stopes driven from No. 3 winze had caved, allowing water to enter the mine.

In order to develop ore in the Little Placer, the owners have rehabilitated the No. 1 shaft to serve as an auxiliary shaft, and the No. 3 shaft was equipped with a steel head frame, ore bin, 300-horsepower Nordberg hoist, and a 3-ton Kimberly skip and cage balanced with a counter weight. No. 3 shaft was deepened 200 feet, and E level was established at about 1,140 feet. A crosscut has been driven northeast to the footwall of the borate body near the southeast corner of Little Placer and thence north to the northeast corner of the property. A winze from the 938-foot level in the old workings follows the hanging wall along the west side of Little Placer and connects with a raise from the north end of the E level crosscut. All blast holes were made with hammer drills.

Cement (See Limestone, Dolomite, and Cement)

Clay

By George B. Cleveland

Bentonite, oil-well drilling mud, and kaolinite are the three principal types of clay found in Kern County. Drilling mud is not a true clay but consists mainly of silt- and clay-size particles of detrital minerals and rocks, and is often considered a bentonite.

Probably more bentonite, especially the variety fullers earth, has been mined in Kern County than any other type of clay. Mining of bentonite began in the early 1900s, but the greatest activity was during the period between the late 1920s and 1945; little has been mined in recent years. Dry lakes in Kern County have yielded many hundreds of thousands of tons of oil-well drilling mud. This clay material was vigorously mined during the 1940s and until about 1954. In 1948 the Federal government began acquiring the dry lake areas for military sites. By 1954, all the larger lakes were within military reservations and mining in them had ceased. A few significant deposits of kaolinite occur in the county and one of them, the White Rock mine, has been continuously operated since about 1930. Common clays, suitable for making structural clay products, occur in alluvial deposits in the San Joaquin Valley and have been mined along the Kern River near Bakersfield. In early 1959 five clay deposits were being mined in Kern County. Of these, one was a bentonite deposit (Amargo); one a bentonite-like deposit (Excel Mineral Company); one a common clay deposit (Tehachapi Lake) one a drilling-mud deposit (McKittrick Mud Company) and one a kaolinite deposit (White Rock).

The yearly production records of clay and clay products in Kern County are incomplete, but the available figures are shown in table 5.

The principal deposits of clay lie in the eastern part of Kern County (fig. 28). The deposits are centered mainly near Rosamond, Tehachapi, and in El Paso Mountains. Most of the bentonite occurs in El Paso Mountains and northeast of Tehachapi and northwest of Boron. The kaolinite deposits lie in two small areas; one area is west of Rosamond and the other area is in Jawbone Canyon. The principal dry lake deposits are directly east of Rosamond.

The bentonite in El Paso Mountains occurs in a predominantly clastic sequence of rocks of Pliocene age (fig. 29). The other bentonite deposits are nearly all associated with volcanic flows and tuffs of Miocene? age. The kaolinite deposits also are closely associated with volcanic rocks of Miocene? age. Some of the deposits occur as alteration zones around metalliferous veins and along the borders of acid intrusive plugs. The dry lake muds and the common clays are of Recent age.

In general, the bentonitic clay deposits are moderately deformed, with dips averaging between 20 and 30 degrees. These deposits are in beds only a few feet thick but some exceed 80 feet. Although these beds may have relatively steep dips they often can be traced for hundreds of yards. For example, the main bentonite bed in the Ricardo formation crops out discontinuously for

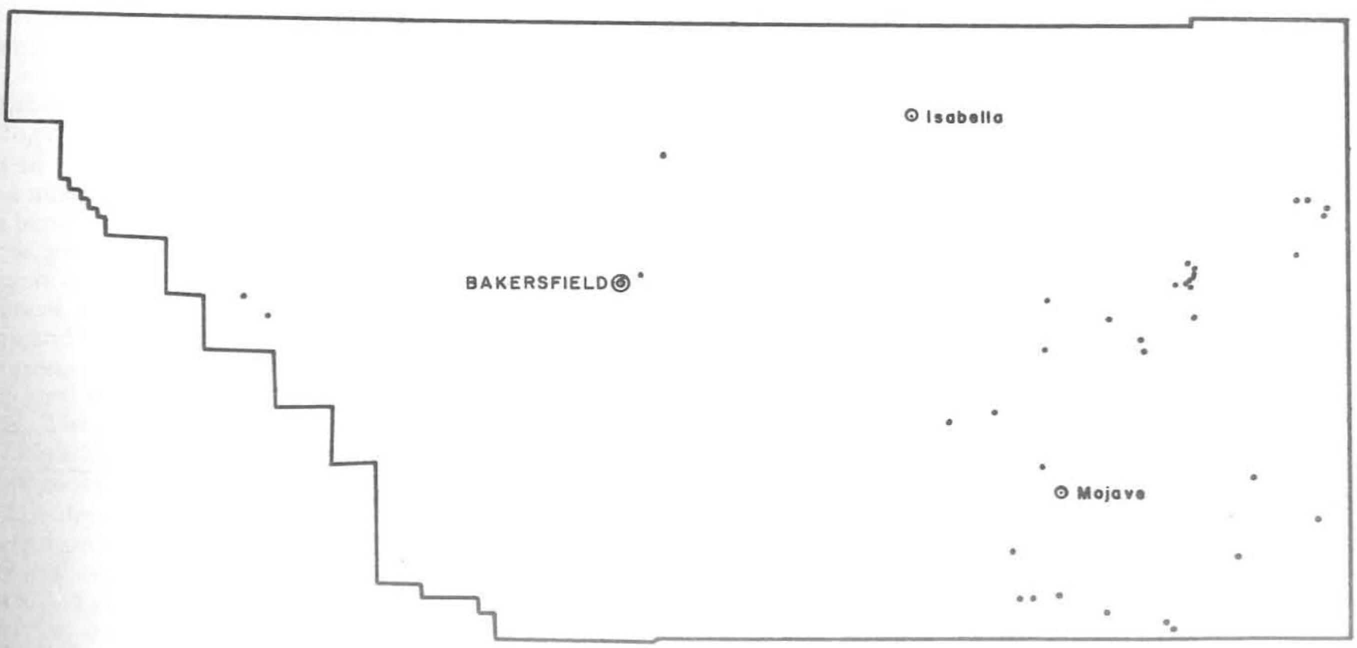


Figure 28. Distribution of clay deposits in Kern County.

Table 5. Production of clay and clay products in Kern County, 1897-1957.
(From Division of Mines reports and Division of Mines—U.S. Bureau of Mines Cooperative Program.)

Bricks			Clay*		Fullers earth	
Year	Thousands†	Value	Tons	Value	Tons	Value
1897	1100	$6,600				
1898	2000	14,000				
1899	1600	11,400			620	$12,400
1900	2525	17,300			500	3,750
1901	4600	23,400			100	19,500
1902	3500	24,500			987	19,246
1903	9000	30,000			250	4,750
1904	700	4,900			500	9,500
1905	750	6,000	53	$54		
1906	4275	34,200	215	752		
1907	2168	18,428				
1908	2080	19,552				
1909	3365	29,634			359	5,385
1910	8332	63,711	242	121		
1911	5603	41,426				
1912	1890	23,120				
1913	1625	22,000	208	104		
1914	3834	29,214	346	172		
1915				c		
1916	3177	23,824		c		
1917		22,785[1]		c		
1918	1678	16,380				
1919	1709	175,112[2]				
1920	3850	56,550				
1921	5840	85,820				
1922	5082	66,652				
1923	5271	68,375				
1924	and clay	23,058				
1925		c		c		
1926	4591	55,140				
1927	4835	50,438		c		
1928	2126	30,791		c		
1929	3503	44,681	58,551	85,845		
1930		c	371,123	117,834[2]		
1931		c	27,499	46,668		
1932		c	14,770	22,871		
1933		c		c		
1934		c	19,526	30,142		
1935		c		c		
1936		c		c		
1937		c	42,628	130,482		
1938		c	38,910	64,821		
1939		c	23,213	32,373		
1940		c		c		
1941		c	69,671	242,547		
1942		c	71,172	118,694		
1943		c	96,619	261,243		
1944‡			152,237	522,711[3]		
1945			168,925	711,676		
1946			177,960	544,841[3]		
1947			213,475	746,372		
1948			215,953	768,280		
1949			202,509	699,635		
1950			93,026	524,084		
1951			96,280	700,620[4]		
1952			122,406	831,901		
1953			68,324	599,704		
1954			46,266	433,994		
1955			46,315	456,115		
1956			49,596	208,016		
1957			44,300	268,437		

* May include common clay or oil-well drilling mud or both.
† Four tons of clay will make about 1,000 standard bricks.
[1] Includes tile
[2] Value reported appears unreasonable.
[3] Bentonite not included.
[4] Fullers earth not included.
c Combined with other mineral commodities.
‡ After 1943 clay and fullers earth production figures were not shown separately. Values indicated include all three categories.

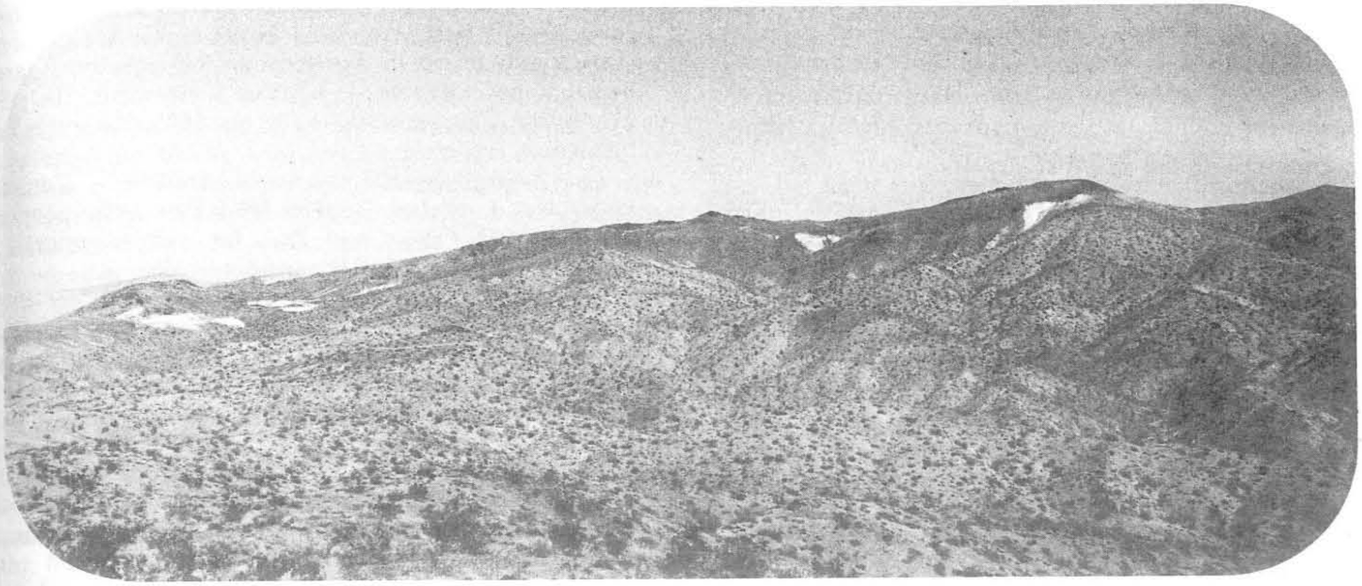


Figure 29. View to northeast of bentonitic clay bed in southwestern El Paso Mountains. Clay bed, in the Pliocene Ricardo formation, is continuous between all white outcrops. Snow White mine is at left margin of photo, Gladding McBean property is at right margin.

at least 18 miles. The kaolin deposits are irregular and relatively small. The dry lake deposits are flat lying and generally less than 5 feet thick, but cover areas of several square miles.

Types of Clay

Bentonite. The development of the petroleum industry created a substantial market for clay. This industry, formerly used large quantities of clay mined in Kern County as an adsorbent in refining petroleum products. The availability of higher-grade clay, obtained elsewhere, has caused the mining of adsorbent clay in Kern County to nearly cease. The Filtrol deposit near Tehachapi, which was one of the most productive sources of adsorbent clay, has been idle since 1936.

Rogers (Muroc), Buckhorn, and Rosamond dry lakes, east of Rosamond, have yielded nearly all of the drilling mud mined in Kern County. These areas are now within the boundaries of Federal military reservations and mining is prohibited in them. Immediately prior to the accession of these lake basins for military sites, the government allowed operators to stockpile several hundred thousand tons of clay. These stockpiles are still adequate for many more years at the rate of consumption in 1958, and new sources of material were not being sought in 1958. The principal deterrent to the future use of these materials however, lies in the growing competition from other so called "drilling mud chemicals."

The dry lake deposits and the stockpiles of clay are located near the Southern Pacific and Santa Fe Railroads and are marketed mainly in the southern San Joaquin Valley. Large quantities of clay are also transported south to the Los Angeles basin, but here sources in the Wilmington area supply part of the market. The Ventura County oil fields are also supplied from the Kern County deposits.

Barite and clay are mixed by drilling-mud producers to control density. Barite for this purpose is mined in Nine Mile Canyon in southeastern Tulare County and near Barstow in San Bernardino County.

The relatively long distance that the dry lake muds must be transported to the southern San Joaquin Valley gives some advantage to other lake deposits situated closer to the valley market. Deposits in western Kern County are smaller and occur in depressions along the west side of San Joaquin Valley near McKittrick. Although they supply only a small part of the local market, the desirable properties of these clays are such that, until 1956, they were marketed for drilling mud as far away as Texas. These clays are also suitable for sealing reservoirs and ditches and a small tonnage is sold annually for this purpose.

Other bentonitic clays in the county have been used as fillers in hard rubber and soap products and as an adsorbent of grease in commercial laundries.

Kaolinite. Generally, the kaolinite deposits in Kern County do not compare in size or purity with the high-grade fire clays that occur in the Ione or Silverado formations elsewhere in California. However, thousands of tons have been used in dinnerware, artware, and pottery and sold for minor uses in the Los Angeles area. The distance from market, the size and irregular shape of the deposits, and the generally impure grade of most of the material has restricted the mining of these clays.

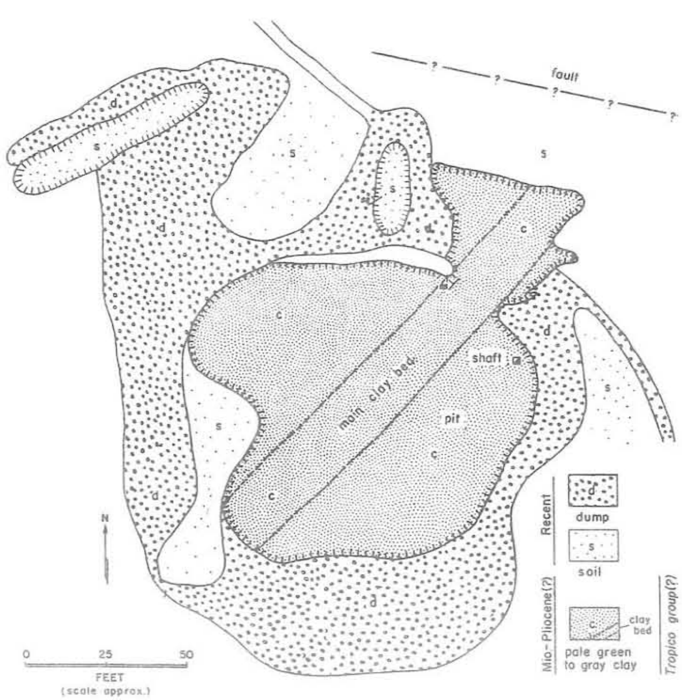
The growth of the petroleum and agricultural industries in the southern San Joaquin Valley has created a market for structural clay products, especially in the

Bakersfield area where Kern County's only brickyard is located. This market is supplied to a minor extent by brick producers in Tulare and Los Angeles Counties.

Future Sources

Future sources of clay material suitable for drilling mud may be found in other dry lakes near those which have already been exploited and in smaller structural depressions along the Garlock and El Paso fault zones. The latter occur at Goler (Mingus deposit) and along U. S. Highway 6, one mile northeast of Cinco. A slightly swelling bentonite occurs in the tuffaceous beds exposed on the east side of Redrock Canyon about one mile north of its mouth. Thick and rather steeply dipping beds of bentonite occur interstratified with magnesite beds southeast of Mojave (see description of Bissell deposit in magnesite section). Dibblee (1952, p. 22) mentions several reddish colored clay beds in the Goler formation. This formation, which is Paleocene in age (McKenna, 1955, p. 514) is exposed in the central part of El Paso Mountains. These clays are associated with coal; the clay-coal association and the Paleocene age of the formation are characteristics of fire clay deposits elsewhere in California. The nature of the clay beds in El Paso Mountains and their volume, however, are not yet determined. Rhyolite plugs, which are associated with the known kaolin deposits, occur in several areas in the county and bear closer inspection as future sources of this type of clay. The most promising area would be in Jawbone Canyon, south and west of the present productive area.

Figure 30. Geologic sketch of the Amargo clay deposit.



Amargo Bentonite Deposit (Vanuray Claim). Location: N½NE¼ sec. 26, T. 11 N., R. 8 W., S.B.M., about 3 miles northwest of Boron and south of the Kramer borate mines. Ownership: Charles J. Roycroft, P.O. Box 211, Boron. The property comprises 160 acres and is held by an association claim.

The Amargo deposit was opened in 1939 by Kennedy Minerals Co. of Los Angeles who leased the property through 1941. These and later intermittent operations have yielded about 6,000 tons of clay.

A poorly exposed bentonite bed, about 20 feet thick, occurs in a lake-bed unit that apparently can be correlated with the Mio-Pliocene? Tropico group that is exposed in the vicinity of the Kramer borate mines (Dibblee, 1958, p. 139). The bentonite is underlain by a pale-gray, hard siliceous shale and overlain by other shales and 2 to 3 feet of soil. The bed is poorly exposed for a distance of about 150 feet. The clay is greenish-gray, sandy, and swells slightly when immersed in water. It contains minor amounts of carnotite, opal, and iron and manganese oxides as coatings on shear planes (Walker and others, 1956, p. 19). The beds strike about N. 30° E. and dip 55° NW. and appear to be cut off by a fault on the north end of the deposit (fig. 30).

The mine has been developed by an irregular pit that is about 150 feet long and as much as 15 feet deep. Both bulldozer and dragline have been used to mine the clay.

The clay has been sold mostly to the laundry industry as a grease adsorbent. For this purpose soda ash was added to increase the cleansing properties of the clay. Most of the clay was sold in the Los Angeles area at \$5.00 to \$7.50 per ton. Bentonite from Utah has now replaced the Amargo material in this use. In recent years the clay has been sold only for reservoir lining at about \$1.00 per ton, plus mining and loading costs. Small amounts are sold in the western Mojave Desert and some is marketed in Los Angeles.

Because the deposit is poorly exposed, no estimate can be made of the total reserves. At least, several thousands of tons could probably be mined south of the present workings, where the deposit is covered by a thin mantle of soil.

Bakersfield Sandstone Brick Company. Location: 315 East 18th Street, Bakersfield. Ownership: Bakersfield Sandstone Brick Company. The property comprises several acres of patented land.

The first plant on this site was built in 1886 by James Kurran who utilized alluvial clay material, quarried on the property, to make bricks. The total production of clay from the property was not determined by the writer but in recent years about 500,000 bricks per year have been produced. No bricks were produced in 1958.

Clay material is no longer mined on the property but is purchased on a contract basis and hauled to the plant from deposits east of the city.

The bricks are made by the old sand-mold process. The clay material is dumped into a hopper from which it is fed into a trommel at a uniform rate. The trommel re-

moves any large rock fragments. Clay material from the trommel is reduced to a uniform size in a hammer mill, pugged with water, and fed into a press. The press forces the soft mud into a wooden mold which has a capacity of six bricks. The mold is lined with fine sand which prevents the bricks from sticking. After the mold is filled it is struck by mechanical hammers which jar the bricks out of the mold on to a moving belt. Fourteen molds are used in a closed circuit. The bricks are stacked on wooden pallets and dried in the sun for about a week. The green bricks are then fired in field kilns for about 8 days. The finished bricks are somewhat pale in color and not as hard as those produced by the extrusion process. The plant has a capacity of 35,000 bricks per day. In early 1959, standard bricks were sold for $40 per thousand.

The principal market area is in western Kern County although bricks have been sold in Santa Barbara, Fresno, and Los Angeles.

*Excel Mineral Company Mine.** Location: NE¼ sec. 5 and NW¼ sec. 4, T. 30 S., R. 21 E., M.D.M., about 7 miles northwest of McKittrick. Ownership: R. H. Anderson Inc., Bakersfield owns 1,300 acres of patented land; leased by Excel Mineral Company, 3461 East 26th Street, Los Angeles.

The Excel Mineral Company mine, which has been operated since about 1942 has yielded an estimated total of 35,000 tons of clay shale through 1958.

The deposit consists of poorly bedded white to pale gray tuffaceous shale at least 200 feet thick. This bed occurs as part of a thick succession of similar shale beds of middle Miocene Maricopa shale (English, 1921) which locally contains lentils of brownish-yellow dolomitic limestone. The Maricopa shale dips steeply to the northeast in the mine area and extends several miles farther northwest and southeast from the mine. The quarried material is hard, fine grained, and exhibits strong adsorptive properties. It is composed mainly of altered tuffaceous particles, which are now largely sericite, and minor amounts of quartz.

The material is mined by open pit methods. It is transported in 12-cubic yard trucks to a nearby plant where it is stockpiled and allowed to dry. After drying it is crushed in a hammer mill and passed over vibrating screens which size the material to minus 8 and plus 35 mesh. It is then kiln dried and bagged. The capacity of the plant is estimated to be 8,400 tons per year. The minus 8 to plus 35 fraction is sold to machine, aircraft, and other heavy industries as an oil adsorbent for floor sweepings; it is also marketed for general household purposes. The fines which pass the 35 mesh screen are sold for insecticide carriers and other special uses.

Filtrol Bentonite Deposit (Filtrol Company's Clay Deposit; Filtrol Fullers Earth Deposit). Location: sec. 2, T. 32 S., R. 34 E., and sec. 34, T. 31 S., R. 34 E., M.D.M., about 9 miles northeast of Tehachapi. Ownership: Filtrol Corp., 3250 East Washington Blvd., Los Angeles. The property comprises 1,280 acres.

* The information on this mine was provided by Earl W. Hart and Frederic R. Kelley, 1957.

The Filtrol bentonite deposit was discovered by William Cuddeback, of Monolith, in 1927 and was leased to the Filtrol Corp. the same year. Mining began immediately (Tucker, 1929 p. 66) and continued until 1936 but has been inactive since that time. Total production from the deposit is undetermined.

The deposit is a claystone layer exposed on the east wall of a narrow canyon. It is part of the Kinnick formation which consists predominantly of volcanic rocks, and is of Miocene age. This formation crops out over an area of about 25 square miles (Buwalda, 1954, p. 134). The claystone is a small layer about 7 feet thick intercalated with tuffaceous shales, mudstone, and tuff and overlain by andesite (?) flows. These beds dip gently southwest and strike about N. 50° W. The clay crops out for several hundred feet along the strike. The material is grayish-white, coarse grained, and breaks with an irregular fracture. It is composed principally of fresh volcanic ash partly altered to montmorillonite. It also contains angular fragments of sanidine, plagioclase feldspar, hornblende, chlorite and a zeolite. The material is a non-swelling, naturally active, but not activatable bentonite (Kerr and Cameron, 1936) (table 6).

*Table 6. Chemical analysis of the Filtrol clay.**

	Percent		Percent
SiO_2	53.88	K_2O	0.39
Al_2O_3	11.66	Na_2O	0.15
$FeO+Fe_2O_3$	4.60	P_2O_5	0.16
MnO	0.18	CO_3, SO_3, ZrO_2	none
CaO	1.56	H_2O^-	8.21
MgO	8.61	H_2O^+	9.98
TiO_2	0.44		
			99.82

* From Kerr and Cameron (1936).

McKittrick Mud Co. (Midway Mud Co.) Mine. Location: NE¼SE¼ sec. 14 and NW¼SW¼ sec. 13, T. 30 S., R. 21 E., M.D.M., about 3 miles west of McKittrick. Ownership: Shell Oil Company owns about 320 acres of patented land; leased by William A. Wheeler, P.O. Box 356, McKittrick.

The deposit at the McKittrick Mud Company was opened about 1938. Total production is undetermined.

The deposit consists of horizontal layers of pale greenish gray mudstone, about 18 feet thick. It is overlain by a pale brownish gray mudstone, about 8 feet thick. The mudstone has accumulated in a small depression, apparently a sag pond along an east-trending fault. It overlies shale and loose rock and is overlain by about one foot of soil. The operators refer to the lower mudstone as the "light clay", and the upper as the "heavy clay". The mudstone swells slightly and probably contains some bentonite. Gypsum is also present and may have been deposited by a sulfurous spring near the west end of the deposit. The beds gradually thicken from west to east. The clay was derived by erosion of surrounding marine formations, which are Miocene in age. Seasonal rains supply minor amounts of clay to the basin. Throughout

the year the lowest part of the pit is filled with water. The operators state, however, that after an earthquake in recent years the lake drained within a few days and remained dry for two years. The deposit is probably Recent in age as at a depth of about 20 feet the operators state that a kitchen midden was uncovered.

The clay material has been mined from a pit about 1,800 feet long, 250 feet wide, and as deep as 40 feet. Mining is done during the summer months on a contract basis. The material is moved by bulldozer and scraper to the plant near the east end of the deposit where it is stockpiled according to grade. Three grades are recognized: (1) "heavy clay," which yields 80 to 82 pound-per-barrel mud; (2) "light clay," which yields 70 to 72 pound-per-barrel mud; and (3) "salt" clay which is of a much lower grade. The material is dried, reduced to about 1 mm or less in a hammer mill, and then passed over a 10-mesh screen. Part of the material is bagged; the other part is sold in bulk lots. The mill is operated throughout the year and is capable of yielding 12 tons of "heavy" or 6 tons of "light clay" per hour. Annual production amounts to about 6,000 tons. The clay is sold locally for $10 per ton in bulk and $15 per ton in sacks (October, 1958). Most of the material is used as a base for oil well drilling mud and is said by the operators to be suitable for shutting off gas. Infrequently, small tonnages are sold for lining reservoirs and irrigation ditches. It is marketed for this purpose mainly in the southern San Joaquin Valley agricultural area, but has been shipped as far north as Watsonville in Santa Cruz County. Prior to 1956 a significant quantity of this clay was marketed in Texas to the Magnet Cove Barium Corp., who sold it for drilling mud. The freight rate was $14.80 per ton.

As the reserves of this deposit are limited the company plans to develop a deposit about three quarters of a mile to the west which contains an estimated 20,000 tons of suitable clay material.

Muroc Clay Deposit (Bager Placer Claim). Location: S½SE¼ and SE¼SW¼ sec. 3, and SW¼SW¼ sec. 2, T. 11 N., R. 9 W., S.B.M. (proj.) about 21 miles east of Mojave. Ownership: W. Herbert Allen, Title Insurance and Trust Company, 433 South Spring St., Los Angeles. Leased by Sunray Mid-Continent Oil Company, 714 West Olympic Blvd., Los Angeles. The property comprises 160 acres and is a patented placer claim.

The Muroc clay deposit was first developed by William H. Allen Jr., who purchased it for $25,000 about 1928. The mine was operated nearly continuously until about 1945. Only a small tonnage of clay was mined during the 1940s and the mine has been idle since 1945. The total production is estimated to be about 40,000 tons (W. Herbert Allen, personal communication, 1958).

The clay deposit is exposed on the west, east, and north sides of a low hill near its base. The clay occurs as a single layer intercalated in a series of lacustrine sediments and capped by basalt. This series is Miocene? in age and is included in the lower part of the Tropico group which also crops out in the Castle Butte area about 5 miles northwest of the Muroc deposit (Dibblee, 1958, p. 139). The strata exposed at Castle Butte have an aggregate thickness of 1,445 feet and consist principally of lithic tuff, limestone, clay shale, arkosic sandstone, and basalt. Dibblee assigns all beds below the basalt to the lower part of the Tropico group. At the Muroc mine only tuff, clay, and basalt are exposed.

The clay layer is about 6 feet thick and is exposed for about 400 yards along the strike. It overlies a tuff unit that has an exposed thickness of about 30 feet. The clay is overlain by about 35 feet of tuff, swelling bentonite, and ash, and about 10 feet of basalt. The beds dip generally 20 degrees or less. A normal fault of small displacement strikes northeast through the deposit and the north block is dropped down (fig. 31).

The clay is non-swelling, hard, nearly pure white, and breaks with a hackly fracture. The newly mined clay has a high moisture content (table 7) which is rapidly dissipated on exposure to air.

*Table 7. Chemical analysis of the Muroc bentonite.**

	Percent		Percent
SiO_2	61.50	MgO	4.26
Al_2O_3	14.37	Na_2O	0.62
Fe_2O_3	1.36	K_2O	0.42
TiO_2	0.08	CO_2	0.19
MnO	trace	H_2O^-	10.11
CaO	0.15	H_2O^+	6.80
		Total	99.86

* From Lamar (1953, p 302).

The deposit has been developed by numerous vertical and inclined shafts, adits, and trenches. Drifts into the clay bed were extended from the shafts and adits. These openings were made at various places around the exposed part of the deposit. Apparently as each underground working became too extensive, a new one was driven from the surface to shorten the haulage distance. Most of the workings were caved at the time that the deposit was visited in 1958. The present lessee has since filled in all but one access to the underground workings.

The clay was mined by hand and stored on drying racks on the north side of the deposit. After drying for several weeks the clay was transported to Muroc, formerly a station on the Santa Fe Railroad, from where it was shipped to the company's milling plant at Maywood. There the clay was kiln dried, ground, and sacked.

The clay was marketed wholesale for $15 to $17 per ton and retail for $20 to $30 per ton. Most of the clay was marketed in the Los Angeles area where it was used as an adsorbent in refining petroleum products, but much of it went to the Mid-west states especially to the Mid-Continent Oil Company in Oklahoma. The freight rate at that time was about $15 per ton. Some of the clay also was sold in Texas.

The Muroc clay is a naturally active and activatable clay and thus can be classified as a fullers earth. At the time that the Muroc deposit was being mined the activation process was protected by patents which were unavailable to the operators of the Muroc deposit. The

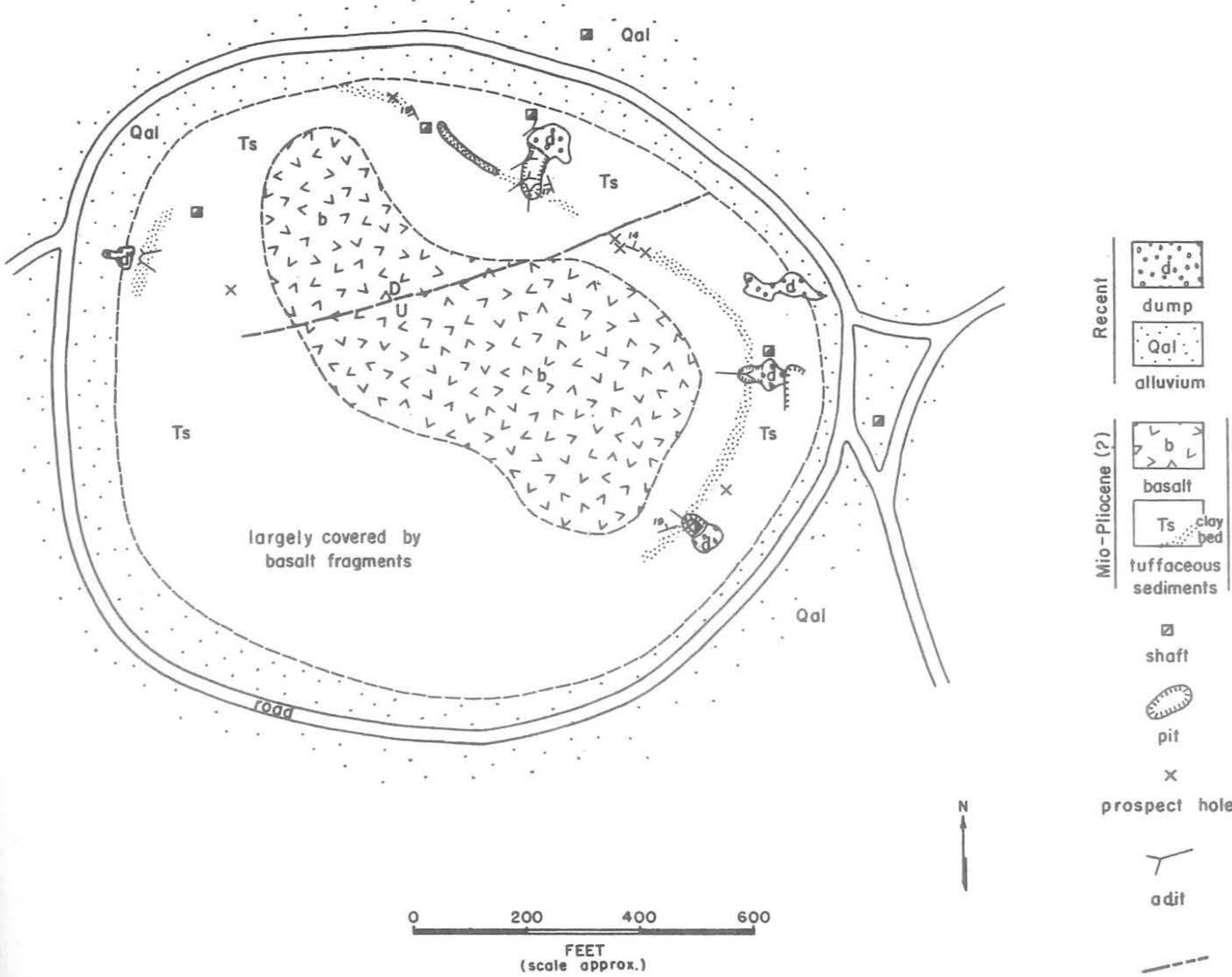


Figure 31. Geologic sketch of the Muroc clay deposit.

natural adsorptive properties of the clay were not as great as those of clay that had been activated, and it was difficult for the Muroc clay to compete in the market. When the patent rights expired the owners of the Muroc mine believed it was nearly worked out and that the cost of building an activation plant to treat the remaining clay was not warranted. The mine was a marginal operation and during some years it was operated at a loss (W. Herbert Allen, personal communication, 1958).

The present lessee was exploring and sampling the property and nearby areas in late 1958.

White Rock (Jawbone Canyon Clay; White Point No. 2, No. 3, No. 4, and No. 5 Claims; Williams deposit) Mine. Location: NE¼ sec. 34, T. 30 S., R. 36 E., M.D.M., about 16 miles north-northeast of Mojave and about 1½ miles south of Jawbone Canyon. Ownership: Joseph Stanko estate and Branch Lawson, 2932 North Gainsborough Drive, San Marino; leased to American Mineral Company (a subsidiary of Desert Minerals Inc.), 840 South Mission Road, Los Angeles 23. The property comprises 80 acres of patented placer claims (White Point No. 2, No. 3, No. 4, and No. 5, 560 acres of patented land in sec. 34, T. 30 S., R. 36 E., and 650 acres of patented land in sec. 27, T. 30 S., R. 36 E., M.D.M.)

The White Rock clay deposit was discovered in March 1926 by C. G. Tailleur and seven others who located the four placer claims noted above. The first operators were the Vitrefrax Company of Los Angeles and Potters, Inc. of El Cerrito. Since the early 1930s the mine has been worked continuously by American Mineral Company. Although the total production is unknown to the writer, the present operators state that the mine has yielded about 5,000 tons of clay per year since 1947 (W. A. Merle, personal communication, 1958).

CLAY

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
41	Aetna group	Secs. 16, 17, T28S, R40E, MDM, 8 miles south of Ridgecrest	Aetna Mines Corp. 126 West 3rd St. Nat. Title Building, Los Angeles 13 (1958)	Nearly flat lying bentonitic clay beds, 2 to 12 feet thick. Intercalated with pale arkosic sandstone and tuff, overlain in part by dark volcanic rocks. Clay probably underlies an area of one square mile. Clay is pink to white, relatively pure, and swells slightly when immersed in water (see geologic sketch map.)	Property comprises 34 placer claims (1,100 acres). Clay exposed by numerous bulldozer cuts and shallow pits. Fifteen drill holes. May include Duran bentonite deposit. Idle 1959.
	Alluvial Silt Company				See Muroc Silt deposit.
42	Amargo bentonite deposit (Vanuray claim; Kennedy Minerals Company mine)	$N\frac{1}{2}NE\frac{1}{4}$ sec. 26, T11N, R8W, SBM, about three miles northwest of Boron and south of the Kramer borate mines	Charles J. Roycroft, P.O. Box 211, Boron (1958)	Swelling bentonite bed, 20 feet thick, occurs in steeply-dipping sedimentary rocks of the Tropico group.	See text. (Tucker, Sampson, Oakeshott 49:245, 276; Walker, Lovering, Stephens 56:19).
	American Mineral Company				See White Rock Mine in text.
43	Antelope Materials Company mine (Macco Construction Company)	Secs. 30 and 32, T9N, R10W, SBM, on Buckhorn dry lake	Macco Construction Company, 815 Paramount Blvd., Clearwater (1949). Area now part of military reservation; mining prohibited	Playa silt deposit. Mineable material ranged from 6 inches to 4 feet in thickness under average overburden of 3 inches. Underlain by sand bed over area of one square mile.	Formerly produced many thousands of tons of clay material from 240-acre area on Buckhorn and Rosamond dry lakes. Material was mined by open pit methods, ground to minus 40 - plus 150 mesh and packaged in 100 pound sacks. Plant capacity 1,000 tons per day. Material was mined for several weeks every year or so and stockpiled. Rosamond mine abandoned because of high salt and gypsum content. Rosamond and Buckhorn deposits withdrawn for military installation about 1954. Company has 100,000-ton stockpile (1958) at Rosamond. Material marketed mainly in southern San Joaquin Valley area, also in Los Angeles and Ventura areas, some shipped as far north as the Rio Vista gas fields. Price \$18 to \$22 per ton F.O.B. plant, Rosamond. (Tucker, Sampson, Oakeshott 49:245, 277t).
	Bakersfield Patent Brick Company	Bakersfield	Undetermined (1958)		Made 600,000 bricks in 1895. Company no longer operating in county. (Crawford 96:614).
	Bakersfield Rock and Gravel Company	Bakersfield (1929)	A. H. Kaspe and W. J. Walters (1929)		Production, if any, undetermined. See under sand and gravel. (Dietrich 28: 89; Tucker 29:64).
44	Bakersfield Sandstone Brick Company	315 East 18th St., Bakersfield	Bakersfield Sandstone Brick Company		See text. (Aubury 06:167-168; Boalich and others 20:48; Brown 16:477; Dietrich 28: 89; Tucker 20:30; 21:307; 29:64).
45	Bissell Deposit	$NE\frac{1}{4}$ sec. 11, T10N, R11W, SBM, 8 miles southeast of Mojave	Southern Pacific Co., 65 Market St., San Francisco (1958)	Several beds of impure swelling bentonite occur in sedimentary magnesite deposit; beds range from one to three feet in thickness, strike N. 80° E., and dip 35° to 58° S.	See Bissell magnesite deposit in text.
	Brown-White (Iron Canyon) mine				See Iron Canyon bentonite mine. (Dibblee and Gay 52:55).
46	California fullers earth deposit	$SW\frac{1}{4}$ sec. 14, T27S, R28E, MDM, about 13 miles northeast of Bakersfield	Undetermined, 1958; C. Weighelt, Bakersfield (1949)	Pale buff, silty, tuffaceous sandstone which contains thin pebbly partings of quartzite, granite, and dark metamorphic rocks. Base not exposed; overlain by about two feet of overburden. Bed is nearly flat lying and may extend over wide area. See geologic sketch map above.	Property comprises 140 acres of patented land. Mine developed by two small open cuts, the largest is exposed for about 75 feet along a low ridge. Cut exposes clay material in face about 20 feet high. Mine first worked in 1898. Material used as an adsorbent in refining animal and vegetable oil. Chemical analyses given by Aubury 06: 275 and by Brown 16:480. Long idle. (Aubury 06:274-275; Brown 16:480-481; Tucker 21:309; 29:65-66; Tucker, Sampson, Oakeshott 49:277).
	Duran deposit	Reported in sec. 21, T28S, R40E, MDM, Rademacher dist., 4 miles north of Rand Siding (1929). Not confirmed, 1958	Undetermined, 1958; J. R. Duran, Randsburg (1949)	White to pink bentonite, 4 to 12 feet thick overlain by basalt.	Exposed in open cuts. Probably now part of Aetna group. (Tucker 29:66; Tucker, Sampson, Oakeshott 49:277t). Idle 1958.
	Eight Oil Company	Not determined	Undetermined, 1958; Eight Oil Company, Bakersfield (1916)		Reported production in Kern Co. Operated small grinding plant at Bakersfield; sold clay 1919-1920. Company no longer operating in county. Brown 16:481; Tucker 21:309).

CLAY, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
47	Excel Mineral Company deposit	NE¼ sec. 5 and NW¼ sec. 4, T30S, R21E, MDM, about 7 miles northwest of McKittrick	Undetermined, 1958; leased by Excel Mineral Co.	Pale tuffaceous shale occurs in gently dipping sedimentary strata of the Maricopa shale.	See text. (Symons and Davis 58:127t).
48	Filtrol Company clay deposit	Sec. 2, T32S, R34E and sec. 34, T31S, R34E, MDM, about 9 miles northeast of Tehachapi	Filtrol Corp., 3250 East Washington Blvd., Los Angeles (1959)	Pale adsorbent bentonite occurs in nearly flat lying tuffaceous sediments of the Kinnick formation.	See text. (Tucker 29:66-67; Tucker, Sampson, Oakeshott 49:245, 277).
	Gladding McBean and Company deposit				See White Clay No. 1 and No. 2.
	Hamilton deposit				See Los Angeles Pottery Company deposit.
	Hancock deposit	Reported in sec. 30, T29S, R38E, MDM, (1952); not confirmed, 1959	Undetermined, 1959; Hancock Oil Company, P.O. Box 810, Long Beach, 1		Filter clay produced. (Dibblee and Gay 52:55).
49	Iron Canyon bentonite (Brown-White; Sesomotite mine) mine	NE¼SE¼ sec. 25, T29S, R37E, MDM, about 5 miles north of Cantil	E. M. Brown and others, P.O. Box 11, Cantil (1952)	Pale gray to tan, waxy bentonite which is locally gypsiferious, crops out at bottom of narrow canyon. Bentonite about 5-10 feet thick, underlain by dark greenish-gray to tan impure bentonite which is about 20 feet thick, and overlain by about 50 feet of greenish-gray and pale tan tuffaceous sands and 10 to 15 feet of dark volcanic rocks. Bentonite is in member 2 of the Ricardo formation (Dibblee, 1952, p. 27) which is Plio-Pleistocene (?) in age. Beds strike N. 25° E. and dip 22° NW. Section may be repeated in vicinity of mine by faulting.	Deposit developed by small cuts and a short adit. Production several thousand tons, 1920-1924. Idle 1959. (Dibblee, Gay 52:46, 55t; Tucker:29:67; Tucker, Sampson, Oakeshott 49:277t).
	Jawbone Canyon clay deposit				See White Rock deposit in text. (Tucker, Sampson, Oakeshott 49:246).
	Kennedy Minerals Company mine				See Amargo bentonite deposit in text.
50	Kern County Brick Company	Sec. 21, T29S, R28E, MDM, East Bakersfield (1928); not confirmed, 1958	Undetermined, 1958; King Lumber Company (1928)		Deposit worked beginning about 1900. Company no longer operating in county. (Aubury 06:374; Boalich and others 20:48; Brown 16:478; Dietrich 28:89; Tucker 20:30; 21:307; 29:64).
	King Lumber Company				See Kern County Brick Company. Dietrich 28:89; Symons 28:263).
51	Koehn deposit (Red Rose claim, White Rose claim)	NE¼SW¼ sec. 20, T29S, R38E, MDM, about 6½ miles north-northeast of Cantil in Last Chance Cyn.	Undetermined, 1958; Charles Koehn, Gypsite, (1949)	Alternating layers of white swelling and non-swelling bentonite 8 feet thick occur on steep western slope of Last Chance Cyn. Clay underlain by pale grayish-green tuffaceous sands and overlain by pale greenish-gray shaley tuff, bright pink tuff, and thick black flow. Clay occurs in member 2 of Ricardo formation (Dibblee, 1952, p. 27) which is Plio-Pleistocene (?) in age. Beds strike N. 40° E. and dip 19° NW.	Deposit developed by two adits; the north adit trends N. 75° W. and is about 35 feet long, the south adit trends N. 40° E. and is about 20 feet long. Idle 1959. (Dibblee, Gay 52:55t; Tucker 29:67; Tucker, Sampson, Oakeshott 49:277t).
	Los Angeles Clay Company				See Snow White; Hancock; Iron Canyon (Brown-White) Deposits. (Dibblee, Gay 52:46).
51	Los Angeles	SE¼ sec. 11, T9N, R13W, SBM, 5 miles northwest of Rosamond Station	Burton Bros. Corp., Tropico Mine, Rosamond, (1958)	Greenish-gray faintly bedded or banded claystone apparently derived from altered volcanic rocks. Clay relatively hard, granular, and contains hard impurities. Banding dips generally to the south, clay overlain by reddish brown soil. See geologic sketch map (Fig. 32 above).	Mine developed by open pit about 150 feet long, 75 feet wide, and 25 feet deep, and by a 200-foot adit, now caved. Material was shipped to Los Angeles for processing and sold for making pottery and fire brick. Long idle. (Aubury 06:212; Boalich and others 20:48; Brown 16:478).
	Los Angeles Pressed Brick Company				See White Clay No. 1 and No. 2. (Dibblee and Gay 52:46).
	Macco Construction Company				See Antelope Materials Company mine.
53	McKinney deposit	Reported in sec. 20, T29S, R38E, MDM, (1952); not confirmed, 1959	Undetermined, 1959; Charles McKinney, Saltdale (1949)		No production reported. (Dibblee, Gay 52:55t; Tucker 29:67; Tucker, Sampson, Oakeshott 49:277t).

CLAY, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
54	McKendry bentonite deposit	NE¼ sec. 8, T30S, R38E, SBM	E. S. McKendry and Pancho Barnes P.O. Box 37, Cantil (1959)	Steeply dipping, greenish-gray, plastic, bentonite, 6 feet thick, exposed for several hundred feet in shallow pit. Clay slightly swelling and contaminated with caustic salts.	Developed by shallow pit. Used for oil well drilling mud and for tile. About 200 tons produced 1928 to 1929. Proved unsatisfactory for drilling mud. Property comprises one association placer claim. Idle 1958.
55	McKittrick Mud	NE¼SE¼ sec. 14 and NW¼SW¼ sec. 13, T30S, R21E, MDM, about 3 miles west of McKittrick	Shell Oil Co.; leased by William A. Wheeler, P.O. Box 356, McKittrick (1958)	Brown to green mudstone exposed in depression along fault zone; clay beds about 26 feet thick.	See text. (Symons and Davis 58:127).
	Merry Widow mine	Reported in SW¼ sec. 8, T9N, R12W, SBM, (1928); not confirmed, 1958	Undetermined, 1958; Mary Y. Smith, Rosamond (1928)		Two lode claims (gold). No production. (Dietrich 28:90).
56	Mingus deposit	N½ and SW¼ sec. 7, T29S, R40E, and E½ sec. 12, T29S, R39E, MDM, about 6 miles northwest of Randsburg	Samuel M. Mingus, P.O. Box 94, Randsburg (1958)	Playa lake deposit in structural depression along El Paso fault. Deposit is about 3/4 mile long and ¼ mile at its widest point. A well drilled near the center of the deposit penetrated 60 feet of fine-grained sediments.	Material may be useful as a base for oil well drilling mud. Material fires dark brownish-red and shows considerable shrinkage. No production or development work.
	Mojave Corp.				See Muroc silt deposit. (Symons and Davis 58:127).
	Monolith clay deposit				See Tehachapi Lake clay deposit.
	Muroc Clay Company				See Muroc clay deposit in text. (Tucker 29:67-68; Tucker, Sampson, Oakeshott 49:277).
57	Muroc clay deposit	S½SE¼ and SE¼SW¼ sec. 3 and SW¼SW¼ sec. 2, T11N, R9W, SBM (proj.), about 21 miles east of Mojave	W. Herbert Allen, Title Insurance and Trust Company, 433 South Spring St. Los Angeles. Leased by Sunray Mid-Continent Oil Co., 714 West Olympic Blvd., Los Angeles (1959)	Six feet of non-swelling adsorbent bentonite occurs in a predominantly tuffaceous series of beds which are overlain by basalt.	See text. (Tucker 29:67; Tucker, Sampson, Oakeshott 49:277t).
58	Muroc Silt deposit (Alluvial Silt Co.?)	Secs. 21, 22, and 23, T10N, R9W, SBM, on Rogers Dry Lake (Muroc Dry Lake)	Formerly Mojave Corp., 1074 West Los Nietos Road, Los Angeles (1949). Part of U. S. military reservation; mining prohibited (1959)	Playa lake deposit. Fine-grained sediments low in sand underlie 4 to 6 feet of overburden.	Many thousands of tons mined before area acquired by Federal government. Corp. has 500,000 ton stockpile near Boron (1958). Material sold for oil well drilling mud mainly in southern San Joaquin Valley but also in Los Angeles and Ventura areas. Once marketed in Australia, Alaska, and South America. F.O.B. plant Los Angeles area $7 per ton (1958). (Symons 28:263t; Tucker 29:64; Tucker, Sampson, Oakeshott 49:246).
	Pacific Sewer Pipe Company				See Los Angeles Pottery Company deposit. (Boalich and others 20:48).
59	Placer Claims	Secs. 32, 33, T9N, R20W, SBM, at the east margin of Cuddy Valley, between Lake of the Woods and the Kern Co. line	Mineral Materials Co., 1145 Westminster Ave., Alhambra (1959)	Tertiary clay shale.	Four unpatented placer claims total about 500 acres. No production.
60	Red Hill deposit	NE¼SE¼ sec. 29, T30S, R37E, SBM, about 2 miles northeast of Cinco	Desert Irrigation and Land Company, Lancaster (1959)	Green, yellowish-gray, bluish-gray and purple and gray mottled gritty claystone intercalated with reddish-brown agglomerates and flows are exposed in a narrow canyon. Aggregate thickness of clay beds is about 30 feet. Beds dip gently toward the north and are lenticular. Claystone is exposed for several hundred feet along both sides of the canyon. Clay apparently derived from sedimentary rocks by hydrothermal alteration?	Developed by small open cut on north wall of canyon. Deposit was active 1920 to 1921. Production estimated to be 3,000 to 4,000 tons. P.C.E. 19 (?) (Martin Engel, personal communication, 1959).
	Red Rose claim				See Koehn deposit. (Dibblee, Gay 52:55t).
61	Riley Clay deposit	Sec. 19, T9N, R11W, SBM, on Rosamond Dry Lake	Formerly Southern Pacific Co; leased to O. L. Riley Co., 1665 North Ventura Ave., Ventura (1949). Part of military reservation; mining prohibited (1959)	Playa lake deposit of fine-grained sediments.	Clay formerly mined from shallow cuts, ground and packed at mill north of mine and sold for oil well drilling mud. (Tucker, Sampson, Oakeshott 49:246,277t).

CLAY, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Rosamond clay deposit				See Los Angeles Pottery Company deposit.
62	Rosamond kaolin deposit	NW¼ sec. 16, T10N, R13W, SBM, 9 miles northwest of Rosamond	Middle Butte Mining Co., Inc. c/o Emory L. Morris and Mary B. Johnson, San Francisco (1958)	Clay occurs associated with metalliferous veins in irregular zones both at the surface and underground. The material is a highly altered volcanic rock consisting principally of kaolinite, alunite, quartz, and hydrous iron oxide staining. The clay is probably part of the Tropico group which is of Mio-Pliocene age.	Property comprises 160 acres of patented land. No recorded clay production. The property was worked for gold between the years 1934 and 1941 (see description of Middle Butte mine in gold section of this report). Clay is reported to be refractory (Cone 31?). Idle 1959.
63	Snow White	NW¼NE¼ sec. 30, T29S, R38E, MDM	Charles Apablasa and J. Salisbury, Cantil (1959)	Pale tan to white bentonite bed 15 feet thick is exposed on south slope of a low hill. The bentonite bed is intercalated with siliceous and swelling clays and is overlain by greenish-gray tuff and dark volcanic flows. The bentonite is in member 2 of the Ricardo formation (Dibblee, 1952, p. 27) which is Plio-Pleistocene (?) in age. The clay contains fresh, angular fragments of fine-grained volcanic rocks and quartz fragments as much as one inch in greatest diameter. The clay was probably derived from a lithic tuff. The clay bed strikes N. 45° E. and dips 17° N. See geologic sketch maps.	Property developed by two open cuts. The east working is about 250 feet long, 75 feet wide, and 20 feet deep. A large room excavated near east end of pit on the north side is 125 feet long, 100 feet wide, and from 12 to 18 feet high. This working is reported to be much more extensive but was partially filled with water in early 1959 (Martin Engel, personal communication, 1959). The west pit lies a few hundred feet from the east pit and is developed on the same clay bed. It is about 200 feet long, 100 feet wide, and as much as 30 feet deep. This property produced many tens of thousands of tons of clay during the 1920's and 30's. Idle 1959. (Dibblee, Gay 52:46,55t; Tucker 29:68; Tucker, Sampson, Oakeshott 49:277).
	Staats and Mahood deposit	Reported about nineteen miles north of Randsburg (1929); unconfirmed (1959)	Undetermined, 1959; Dave Staats, and J. S. Mahood, Randsburg (1929)		Bentonitic clay of good quality reported to be situated near Tracy (Teresa?) siding. May be same as Sweetheart (under Stone) or unnamed #1, which see. (Tucker 29:68).
64	Stevens deposit	SE¼ sec. 17, T29S, R38E, MDM, about 7½ miles northeast of Cantil	Undetermined, 1959; William Stevens, Cantil (1949); deceased (1952)	White to pale gray, bedded lithic tuff partially altered to bentonite	Property comprises four claims. Deposit developed by three short adits. Probably some production. Idle 1959. (Dibblee, Gay 52:55t; Tucker 29:68; Tucker, Sampson, Oakeshott 49:277).
65	Tehachapi Lake clay deposit	E½ sec. 12, T32S, R33E; SW¼ sec. 7, and NW¼ sec. 18, T32S R34E, MDM, about 4 miles northeast of Tehachapi	Monolith Portland Cement Co., Box 65947 Glassell Station, Los Angeles 65 (1959)	Dark brown fine-grained alluvial clay occurs at surface in highland valley over many tens of acres.	Source of clay material for manufacture of portland cement. Has been mined almost continuously since the early 1900's. Property developed by two rectangular pits which are several hundred yards long and wide and average about 10 feet deep. Most westerly pit is abandoned. Clay mined by dragline shovel, loaded into small ore cars, and transported on narrow-gauge railroad 3 miles south to plant. Chemical analysis given in following reference. (Board of Public Service Commissioners 16:98).
	Titus clay deposit				See Los Angeles Pottery Company. (Dietrich 28:89-90).
	Vanuray claim				See Amargo bentonite deposit in text.
	Webb deposit	Reported in NW¼ sec. 10, T9N, R13W, SBM, (1945); not confirmed (1958)	Undetermined, 1958; W. S. Webb, Rosamond, (1949)		Ten-foot-thick clay bed reported to have been developed by a 50-foot tunnel. (Dietrich 28:90; Tucker 29:64-65; Tucker, Sampson, Oakeshott 49:277t).
	White Bluff clay claims	Reported in sec. 18, T29S, R38E, MDM (1949); not confirmed (1959)	Undetermined, 1959; Walter Tisch, Cantil (1952)		Two claims, no recorded production. (Dibblee, Gay 52:55t; Tucker 29:68; Tucker, Sampson, Oakeshott 49:277t).
66	White Clay No. 1 and No. 2 (Los Angeles Pressed Brick Co.) claims	SE¼NE¼ sec. 30 and SW¼NW¼ sec. 29, T29S, R38E, MDM, 5½ miles northeast of Cantil	Gladding McBean and Company, 2901 Los Feliz Blvd., Los Angeles 26 (1952)	White to pale gray bentonite occurs on the nose of a N.-trending spur. Clay is interbedded with thin siliceous layers and overlain by greenish basalt flow. Clay swells slightly and contains abundant angular fragments of fine grained rocks and quartz. Clay bed about 8 feet thick and exposed for about 60 feet. Clay is in member 2 of Ricardo formation (Dibblee, 1952, p. 27) which is Plio-Pleistocene (?) in age. Clay bed strikes N. 20° E. and dips 20° N.	Property comprises two placer claims. Developed by short hillside cut and adit about 20 feet long bearing N. 60° E. No production. Idle 1959. (Dibblee, Gay 52:55t).

CLAY, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
67	White Rock (Jawbone Canyon clay; White Point No. 2, No. 3, No. 4, and No. 5 claims; Williams) deposit	NE¼ sec. 34, T30S, R36E, MDM, about 16 miles northeast of Mojave and about 1½ miles south of Jawbone Cyn.	Joseph Stanko estate and Branch Lawson, 2932 North Gainsborough Drive, San Marino; leased to American Mineral Company, 840 South Mission Road, Los Angeles (1959)	White claystone occurs in large zone of hydrothermally altered rhyolite.	See text. (Tucker 29:65; Tucker, Sampson, Oakeshott 49:246, 277t).
	White Rose claim				See Koehn deposit. (Dibblee, Gay 52:55t)
68	White Swan deposit	SW¼NE¼ sec. 14, T30S, R36E, MDM, ½ mile north of Jawbone Cyn. near Blue Point and about five miles northwest of Cinco	Undetermined, 1959; Raymond Young and Frank Miller, Mojave (1949)	Pale gray to pale green, swelling bentonite intercalated in a series of pink, pale green, and pale gray tuffs; crops out for several hundred yards. Clay bed is about 10 feet thick and has interbedded platy bands. Clay bed strikes N. 40° E. and dips 49° NW.	Clay bed developed by four shallow pits. Property comprises 2 claims. Idle 1959. (Tucker 29:68; Tucker, Sampson, Oakeshott 49:277t).
	Williams				See White Rock deposit in text. (Tucker 29:65).
69	Unnamed clay deposit #1 (Bentonite Knoll #1, #2, and #3)	W½NW¼ sec. 7, T28S, R40E, and SE¼ sec. 1 and NE¼ sec. 12, T28S, R39E, MDM, about 8 miles southwest of Ridgecrest	Undetermined, 1959; G. C. Kane G. N. Hadley Bert Johnson (1946)	Poorly exposed dark gray to nearly white, fine-to coarse-grained tuff locally altered to pale pink and white, swelling bentonite. Tuff bed, several tens of feet thick, locally cut by numerous thin veinlets of calcite. Tuff underlain by metavolcanic rocks which are greenstones in part and overlain by black vesicular basalt. Beds strike S. 75° W. and dip 10° S.	Property developed by three shallow trenches. May be same as Staats and Mahood deposit. Idle 1959.
70	Unnamed clay deposit #2	NW¼ sec. 36, T12N, R13W, SBM, and SW¼ sec. 34, T32S, R35E, MDM, about 4 miles northwest of Mojave in the Horned Toad Hills	Undetermined, 1958	Brown to greenish-gray bentonite bed, 30 feet thick, crops out on the south flank of a low range of hills. Clay is locally gypsiferous and swells slightly. It is underlain by about 100 feet of grayish white fine-grained sediments which contain thin caliche beds. Bentonite overlain unconformably by coarse pink sandstone. Bentonite occurs in Horned Toad formation which is early or middle Pliocene in age. Clay bed strikes N. 55° E. and dips 26° NW. See geologic sketch map (fig. 33).	Deposit developed by several large trenches. Idle 1958.
71	Unnamed #3	SE¼ sec. 32, T30S, R37E, MDM, directly southeast of U. S. Highway 6 and 1 mile northeast of Cinco	Undetermined, 1959	Playa lake deposit; apparently free of soluble salts at surface.	Undeveloped.

The deposit is at the head of a box canyon in a brightly colored body of banded rhyolite of middle Tertiary age (Dibblee, 1958). The rhyolite is intrusive into Tertiary continental sediments which overlie Mesozoic granodiorite. The deposit is irregularly shaped and is exposed over an area of several acres. The claystone shows relic banding and is apparently an alteration of the rhyolite. The altered rock is fine grained. The claystone fractures along the banding planes and normal to them. The banding dips about 30° east to southeast, but locally is contorted into minor folds.

The mineable claystone is partly to completely altered rhyolite and commonly contains opal as small pods and as thin veins along banding planes. The completely altered material is largely kaolinite (?). The claystone is ordinarily white to buff but is stained dark brown along fractures. The principal chemical and physical properties of the White Rock clay are summarized in table 8.

The White Rock deposit has been mined by means of a large irregular open cut on the south wall of a small

Table 8. Chemical and physical properties of the White Rock clay.

(Data provided by American Mineral Company, 1958.)

Chemical analysis:

SiO_2	75.56%
Al_2O_3	14.82
Fe_2O_3	.09
CaO	.22
MgO	.20
K_2O	6.81
Na_2O	.29
Ignition loss	2.04
Total	100.03%

Fired color	White
P.C.E.	17
Water of plasticity	29.6%
Dry shrinkage	4.5%
Fired shrinkage	15.4% at cone 10
Dry modulus of rupture	140 lbs./sq. inch

Figure 32. Geologic sketches of the Aetna group, and California Fullers Earth and Los Angeles Pottery Company clay deposits.

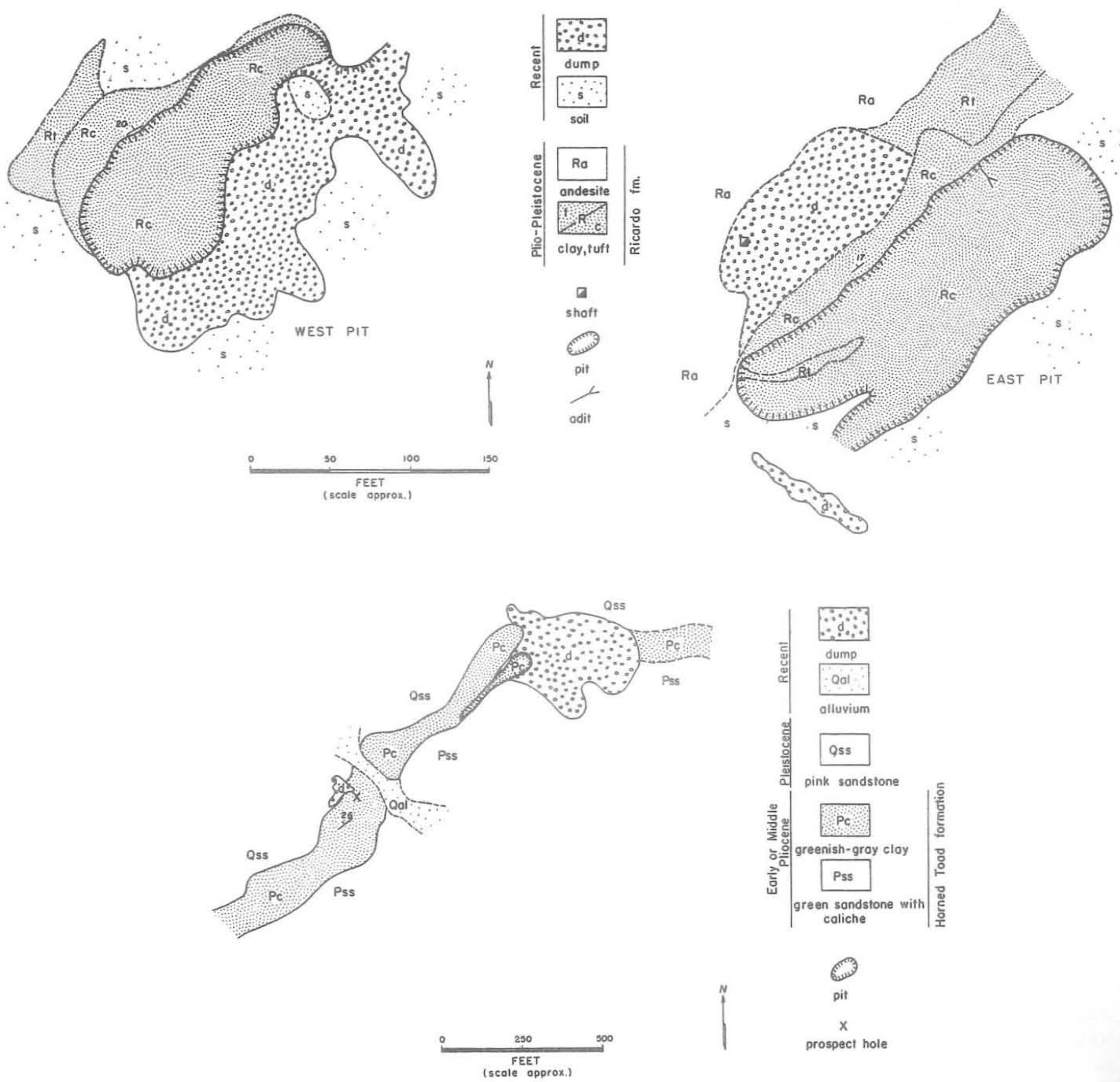


Figure 33. Geologic sketches of the Snow White and Unnamed No. 2 deposits.

canyon. The cut is about 180 feet in maximum length, 130 feet in maximum width, and as much as 80 feet high. The clay is blasted down to the floor of the cut where it is mucked into trucks by a power shovel and bulldozer. Mining is selective to avoid iron-rich zones. The mining is done by an independent organization on a contract basis. The material is trucked 9 miles to Cantil, a station on the Southern Pacific Railroad, from where it is shipped to the company's mill in Los Angeles.

At the mill the clay is reduced to 200 and 325 mesh, sacked, and stored for shipment. The mill has a capacity of 90 to 120 tons per day. The clay is sold for use in dinnerware, artware, tile, and as a filler in rubber. It is marketed principally in southern California, but some of the clay is shipped as far as New York. The processed clay is valued at between 25 and 35 dollars per ton in Los Angeles. Reserves are estimated to be sufficient for many years at the present rate of consumption.

COAL

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
72	Colorado Camp group (French, Randsburg Coal Co.)	SE. cor. sec. 36, T28S, R38E, MDM, El Paso Mts., at head of Last Chance Cyn., 1 3/4 miles southeast of Black Mt.	Stanley H. Hultquist, 3526 Corinth Ave., Los Angeles (1958)	Four layers of coal in the lower part of the Goler formation in what appears to have been a local basin during early Tertiary time. Coal layers reported to be 22, 26, 14 and 18 inches thick at depths of 60, 100, and 145 feet. (Aubury, 1904, p. 19), probably measured on the incline of shafts now caved. Extent and grade of coal not determined in 1958, nor are coal seams exposed at surface.	Coal seams were worked from three shafts 80, 145, and 150 feet deep from which 450 feet of drifts were driven. Workings have been caved for many years. An undetermined amount of coal was produced about 1900. May be same deposit listed under Pomona Mill and Mining Co. About 1948 or 1949, fossil leaves were obtained from coal layer several feet beneath the surface exposed in the walls of a water well near the campsite. (Aubury 04:19t; Brown 16:479).
	French deposit				See Colorado Camp group. (Dibblee, Gay 52:46, 56t; Fairbanks 94:457).
	Pomona Mill and Mining Co.			Fourteen inch coal seam in Tertiary sedimentary rocks.	See under gold. (Crawford 94:147; 96:195).
	Randsburg Coal Co.				See Colorado Camp group. (Aubury 04:19t; Brown 16:479).

Coal and Peat

An undetermined amount of low-grade coal was produced for local consumption before 1900 from a deposit in El Paso Mountains. A reported production of 220 tons of coal valued at $1,100 in 1898 was probably from this deposit and now on property held in the Colorado Camp group. The deposit is of Paleocene age and of limited extent.

Peat is the host for uranium mineralization in a bog on Pettit Ranch in the Sierra Nevada a few miles northwest of the Miracle uranium mine. A layer of peat about 1 foot thick is exposed in Quaternary gravel along the edge of Kelso Creek at Rocky Point a few miles south of Weldon. Neither deposit has been mined.

Copper

Since 1900 about 1,152,000 pounds of copper valued at $206,000 has been mined in Kern County. Most of the copper has come from copper deposits in the Woody district in north-central Kern County but some has been obtained as a by-product mostly from widely distributed gold mines in the county (fig. 34). In the Woody district, a few miles west of Woody in the western margin of the Sierra Nevada, copper mineralization has occurred along shear zones and sheeted zones in granitic rock. The Greenback mine is the most productive copper mine in that district and in the county.

Copper prospects are common in El Paso Mountains, mostly in the NE¼ of T. 29 S., R. 38 E., M.D.M. 12

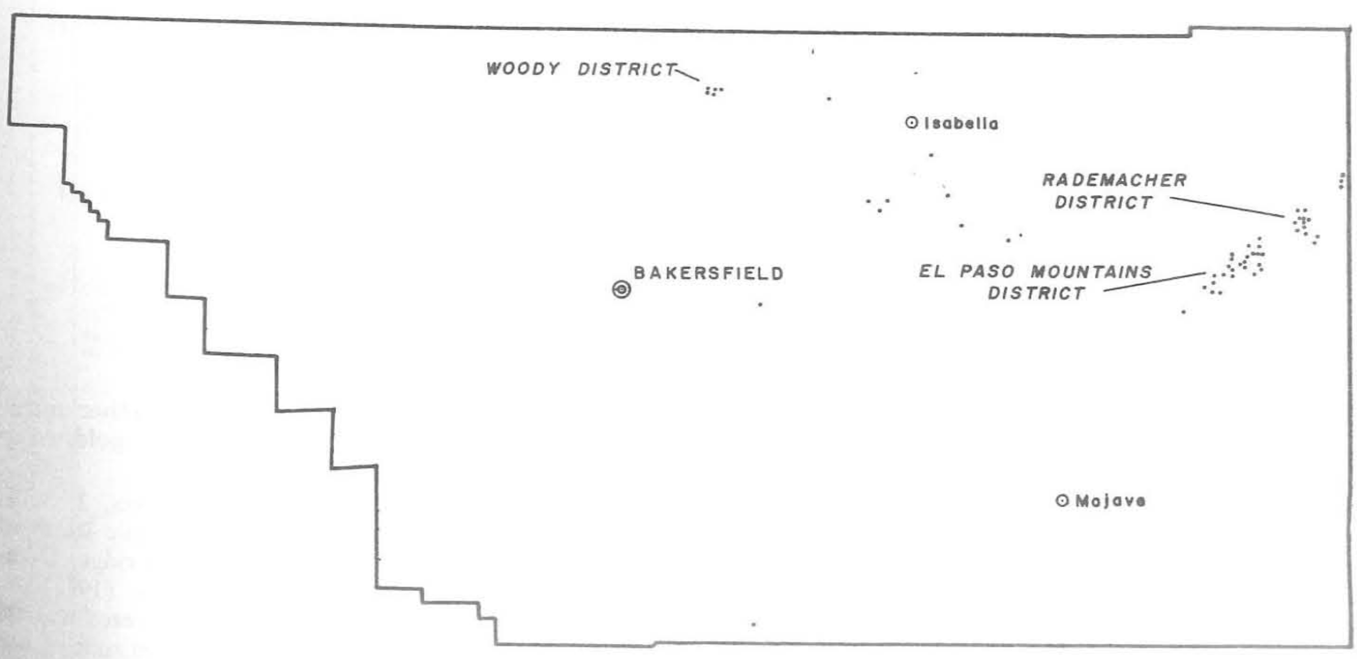


Figure 34. Distribution of copper deposits in Kern County.

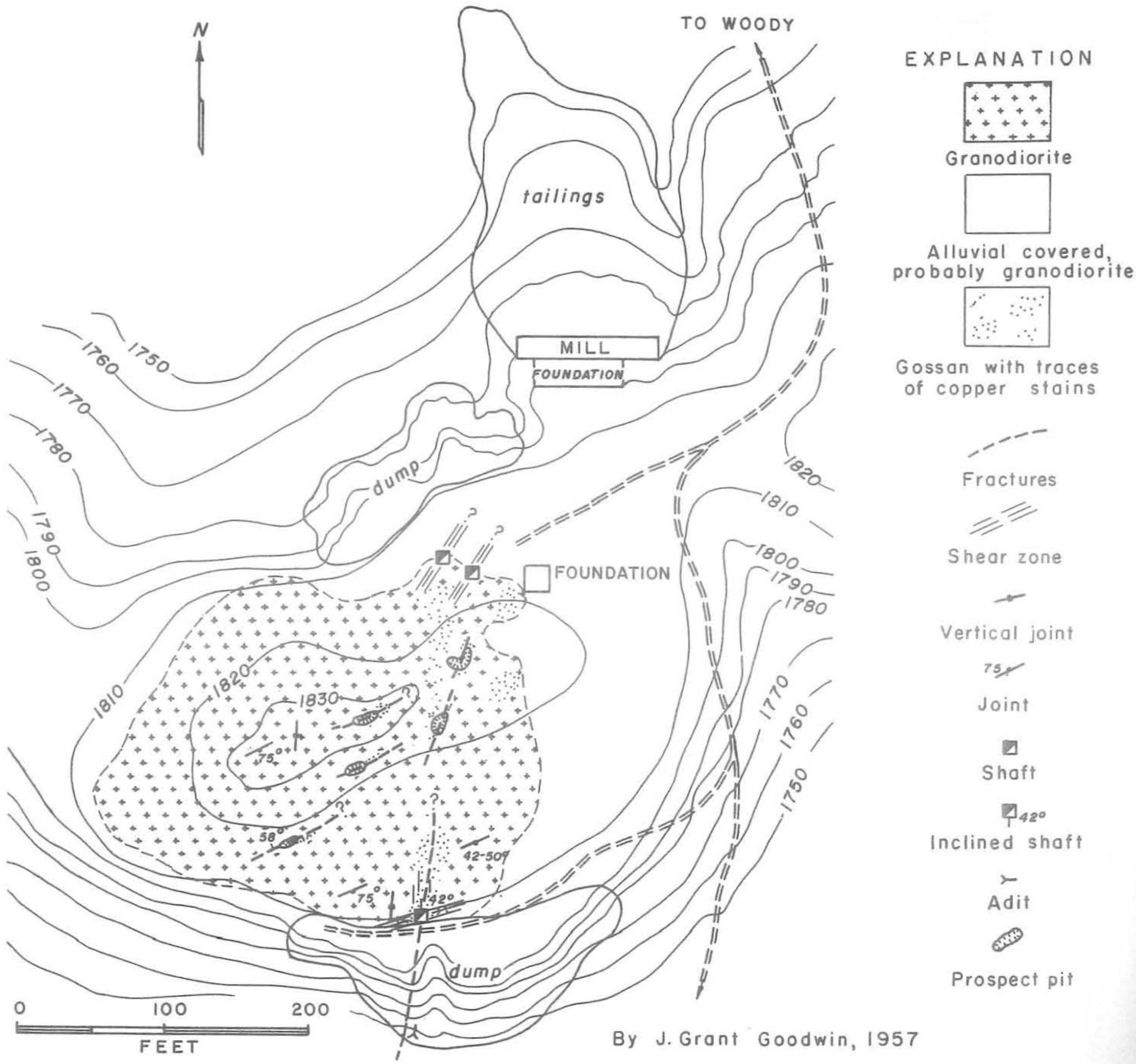


Figure 35. Geologic sketch of the Greenback mine.

miles northwest of Randsburg. Copper sulfides are disseminated in quartz veins in Mesozoic granitic rock and in the Precambrian (?) Mesquite schist. These veins strike northwest to west and dip moderately to steeply northeast and north. In the Rademacher district, 3 to 8 miles south of Ridgecrest, copper is in gold-bearing quartz veins which strike mostly N. 40° W. to N. 40° E. and dip steeply eastward. They are in granitic rocks and very commonly are associated with rhyolitic and dioritic dikes.

Copper minerals are common in many other metalliferous deposits in Kern County, especially gold, tungsten, lead, and zinc deposits.

*Greenback Copper Mine.** Location: Secs. 2, 3, T. 26 S., R. 29 E., M.D.M., a quarter of a mile south of Woody, on top of a narrow west-trending ridge. Ownership: F. G. Weringer, Woody, California (1957).

The Greenback copper deposit was discovered in 1890 and during the period 1890-1900 yielded 590 tons of ore

* By J. Grant Goodwin.

COPPER

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
73	Apache (Holland) mine	SW¼SE¼ sec. 29 and NW¼ sec. 32, T28S, R39E, MDM, El Paso Mts., 14 miles northeast of Cantil	Wesley A. Smith, Neil Brown, John Hamblen, Jr. (on location notice dated Jan. 1954)	Two areas of mineralization about half a mile apart. Northeastern area contains free gold, malachite, chalcopyrite, pyrite, and silver in fracture zone which strikes E. in argillite. Southeastern area contains traces of manganese and copper mineralization in vertical fault zone in limestone and as replacement of limestone by manganese oxides. Fault zone strikes N. 10° W.; limestone strikes N. 50° W., dips steeply NE. to vertical. Grade of ore is low.	Northeast workings consist of an adit driven S. 50° W. at least 350 feet, open cuts, and prospect shafts. Southwest working is vertical shaft probably several tens of feet deep. Several ounces of gold recovered in mill constructed at camp near northeast workings in 1940; also few tens of pounds of copper recovered. Gold ore contained about 0.5 oz. gold per ton. Idle since 1940 (Dibblee, Gay 52:56t; Eric 48:254t; Trask, Wilson, Simons 43:63; 66t; 123t; Trask 50:84; Tucker, Sampson, Oakeshott 49:208, 253t).
	A. Star	Undetermined	R. Brantley, Mojave (1942)		Gold mine. (Eric 48:254t).
74	Austin group	Center of E½ sec. 16, and S½ sec. 9, T29S, R39E, MDM, 3/4 mile northwest of Garlock in canyons on southeast slope of El Paso Mts.	Maynard Schneider, P.O. Box 282, Randsburg (1955)	Bedding plane shear zones in metamorphic rocks strike NW. and dip 30-50° NE. Shear zones are moderately to weakly mineralized with gold, lead, and manganese. Tungsten also reported to occur on the property (ltr. from M. Schneider, Feb. 1955).	Several claims. Probably formerly one of the groups owned by J. D. Voss. Developed by several shafts and crosscut adits. Adit in sec. 16 is driven N. 10° W. and is probably few hundred feet long. Two adits with moderate dumps in bottom of canyon in sec. 9 and several shafts 200 to 500 feet up slopes of steep canyon walls. Probably no production. (Dibblee, Gay 52:58t).
75	B. Copper prospect	SE cor. NE¼ sec. 1, T29S, R38E, MDM, El Paso Mts., 11½ miles northeast of Cantil, on southwest tip of mesa on south slope of Black Mt.	Walter Bickel, P.O. Box 142, Inyokern (1958)	North-trending, east-dipping quartz stringers a few inches wide in deeply iron stained schist. Quartz stringers contains small proportion of chalcopyrite and possibly tiny particles of native copper.	Part of Iron Hat group. Developed by shaft inclined about 40° E. to depth of 75 feet; filled to 45 feet from collar. No production; idle since early 1950's. (Dibblee, Gay 52:56t).
	Big Blue mine			Chalcopyrite and other sulfides in gold-quartz veins.	About 6,500 pounds of copper was produced as a byproduct from gold ore between 1932 and 1942. See under gold. (Eric 48:254t).
	Bimetallic				See Big Gold mine, under gold. (Eric 48:254t).
	Blue Chief				See under gold. (Goodwin 57:527t; Eric 48:254t).
76	Blue Eagle group	Sec. 13, T28S, R39E, sec. 18, T28S, R40E, MDM, Rademacher dist., 9 miles south of Ridgecrest	A. E. Droubie, L. G. Switzer, et al., Los Angeles (1957)	Poorly-exposed, discontinuous copper-stained and iron-stained fractures in granodiorite.	Nine unpatented claims. Exploration by bulldozed excavations and shallow open cuts. Several older shafts on the property. Idle. No production.
	Burning Moscow mine				See under gold. (Eric 48:254t).
	Carbonate Queen	Reported in sec. 6, T31S, R34E, MDM, (1904); not confirmed, 1958	Undetermined, 1958; J. S. Drury, Bakersfield (1904)	Copper carbonates in porphyritic rock.	Uncorrelated old name. May be former name of the Blackhawk mine (Aubury 04:9t).
77	College Girl group (Confidence)	Center sec. 17, T29S, R39E, MDM, El Paso Mts., 1½ miles northwest of Garlock, Mesquite Cyn.	Undetermined, 1958; Real Goulet, P.O. Box 864, Bishop (1952)	NW.-trending, NE.-dipping shear zones and bedding plane shears in metamorphic and granitic rocks. Principal mineralization is associated with iron-stained quartz in shears. Quartz contains free gold, galena, sphalerite, and copper sulfides. Mineralization sparse in 200 foot-wide belt parallel to bedding planes of metamorphic rocks.	Formerly 10 claims along east side of Mesquite Cyn. May be included in part in Gateway group, which see under gold. Deposits have been prospected by numerous opencuts, shafts, crosscut adits, and drift adits along Mesquite Cyn. since 1894. No production. (Dibblee, Gay 52:56t, 59t; Tucker, Sampson 33:296-297).
78	Colorado Camp group (French, Layman, Walsh, and Walsh Mc Claude)	NW¼ sec. 5 and NE¼ sec. 6, T29S, R39E, MDM, El Paso Mts., 13 miles northeast of Cantil, at head of Last Chance Cyn.	Stanley H. Hultquist, 3526 Corinth Ave., Los Angeles (1958)	Copper-bearing shear zones and quartz stringers in schist and argillite. Copper King vein is shear zone, 2 to 3 feet wide, along bedding planes in N.-striking, 55° E.-dipping schist. Zone contains brecciated gray quartz or quartzite in fault gouge. Golden Imp vein is 2 to 8 inch-wide quartz vein which strikes about NW. in argillaceous rocks. Marty veins are weakly mineralized narrow shear zones and bedding plane shears. Copper minerals are chalcopyrite and green copper oxides. Some veins contain traces of gold, silver and lead. Iron oxides stains are very common. Manganese occurs as faint manganese oxide stains in fractures. Golden Imp vein reported to contain 6 percent copper by assay made in 1957.	See also under coal. Formerly three groups of claims - Layman, Walsh, Walsh and McCloude - later included in French group after some claims were dropped; became Colorado Camp group after 1949. Copper and gold veins developed by several shafts east-southeast from camp. Shafts range from few feet to 200 feet deep. Copper King shaft, about 1,000 feet east of camp, is about 200 feet deep on 55° NE. incline and connects about 500 feet of drifts, mostly to south. Other shallow shafts on Golden Imp claim 1,500 feet farther east-southeast, and short adits and shallow shafts on Marty claims 3,000 feet farther east-southeast. A crosscut adit was being driven southwest to intersect the Golden Imp vein at about 50-feet depth early in 1958. No recorded production. (Dibblee, Gay 52:57t; Eric 48:255t, 256t; Trask, Wilson, Simons 43:123t; Trask, et al 50:87; Tucker 21:308-309; 29:23-24; Tucker, Sampson, Oakeshott 49:253t).

COPPER, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Copper Basin group				Formerly 26 claims owned by William Schmidt (deceased) and Mike E. Lee. Four of the claims retained by Lee are listed herein as Lee's copper claims. Other claims held by several individuals. No production. (Dibblee, Gay 52:56t; Tucker, Sampson, Oakeshott 49:208,253t).
79	Copper Chief (Gold Badger, Zundra) group	On sec. line in NW¼SW¼ sec. 7, T29S, R39E, MDM, El Paso Mts., 10½ miles northeast of Cantil, half a mile west of Mesquite Cyn.	Della G. Gerbracht, and others, P.O. Box 346, Randsburg; leased to Donald, Clarence, and Richard Weiss (1958)	Quartz vein containing bornite, chalcopyrite, and copper and iron oxides, occurs in quartz monzonite and metasedimentary rocks. Vein strikes N. 40° W. and dips 65° SW. One lens of copper-bearing quartz about 6 feet wide was exposed in an opencut near the top of a hill.	Five lode claims. Developed by 750-foot crosscut adit driven approximately west to intersect quartz vein exposed on surface. Seven tons of ore shipped before 1949. Intermittent activity in 1958. (Dibblee, Gay 52:56t; Tucker, Sampson, Oakeshott 49:209, 253t).
80	Copperola (Zuna) prospect	NW¼ sec. 13, T29S, R38E, MDM, on narrow ridge at crest of El Paso Mts., 9 3/4 miles northeast of Cantil	Della G. Gerbracht, and others, P.O. Box 346, Randsburg (1958)	Several parallel quartz veins in quartz diorite. Veins strike N. 40° W. and dip 60° SW. Four veins, 6 inches to 3 feet wide, occur in a 100-foot-wide belt that is a few hundred feet long. Copper occurs in small grains and lenses of chalcopyrite and as thin seams of azurite and malachite.	Includes 21 lode claims. Principal shaft is a 50-foot vertical shaft in center of belt of quartz veins. No production. Idle since 1940's. (Dibblee, Gay 52:57t; Tucker, Sampson, Oakeshott 49:208, 253t).
	Copper King	Reported in sec. 26, T27S, R40E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; Underwood and McNitt, Bakersfield (1904)	Quartz vein with sulfides, in granite.	Uncorrelated old name; may be property listed herein under different name. Developed by 18-foot shaft and 30-foot shaft. (Aubury 04:9t).
	Copper King				Probably Silverado mine (Aubury 04:9t); Brown 16:479; Eric 48:254t).
81	Copper Queen claims	SW¼ sec. 27, T29S, R38E, MDM, 6½ miles northeast of Cantil, in small canyon on south-east flank of El Paso Mts.	Isaac Blum, Santa Monica (1958)	Weak copper and gold mineralization along west wall of a N.-trending lamprophyre dike and along NNW.-trending, SW.-dipping quartz vein. Host rock is quartz diorite. Quartz vein is few tens of feet northeast of shaft on lamprophyre dike and probably intersects dike farther north. Quartz vein averages about 6 inches in width and locally contains chalcopyrite grains.	Developed by vertical shaft probably about 250 feet deep on west wall of N.-trending dike and NNW.-driven drift adit few tens of feet northeast of shaft. Drift adit is about 100 feet long with 20-foot raise to surface about 20 feet from portal and 30-foot winze below. One carload ore shipped in 1921. Long idle. (Dibblee, Gay 52:56t).
82	Crystal Springs prospect	NW¼NE¼ sec. 22, T29S, R38E, MDM, El Paso Mts., 8 miles northeast of Cantil, on crest of range	Undetermined, 1958; Frank Curtis, Bakersfield (1952)	Copper-bearing quartz veins in quartz diorite.	No production; idle. (Dibblee, Gay 52:57t).
	Decker claims				See Galena group. (Dibblee, Gay 52:57t).
	French group				See Colorado Camp group. (Dibblee, Gay 52:57t; Tucker, Sampson Oakeshott 49:253t).
83	Galena (Decker) group	Central part of S½ sec. 7, T29S, R39E, MDM, El Paso Mts., 11 miles northeast of Cantil, on west side of Mesquite Cyn.	Donald C. Weiss and others, addresses undetermined (1958)	Copper-bearing quartz stringers in metasedimentary rocks.	Five lode claims. Development work undetermined; a prospect. (Dibblee, Gay 52:57t).
84	Gallow Glass group	T28S, R40E, MDM, Rademacher dist., about 10 miles southwest of Ridgecrest		Traces of copper-bearing minerals in granitic rocks near northwest-trending contact between granitic rocks and metamorphosed carbonate rocks.	Several open cuts and shafts on 37 claims (1905). See also under J. R. Manning. Numerous claims have since been located and abandoned in the area. (Aubury 05:241; 08:297; Eric 48:255t).
85	Gem prospect	SW¼ sec. 34, T29S, R30E, MDM, 2½ miles north of Bena	Undetermined, 1958; Wm. Harmon, address undetermined (1938)		Shallow open pits along contact between schist and sandstone. Long idle.
	Gessell, W. J.				See Mineralite-Azurite prospect. (Eric 48:254t).
	Gladys prospect				See under gold.
	Gold Badger claims				See Copper Chief group. (Tucker, Sampson, Oakeshott 49:253t).
86	Golden Eaglet and Queen claims	Approx. center sec. 5, T29S, R39E, MDM, El Paso Mts., 12½ miles northeast of Cantil	Della G. Gerbracht, P.O. Box 346, Randsburg (1958)	Copper-stained quartz stringers in Paleozoic metasedimentary rocks.	Fifteen claims. Developed by shallow excavations. An idle prospect. (Dibblee, Gay 52:57t).

COPPER, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
87	Golden View claims	Sec. 4, T29S, R39E, MDM, El Paso Mts., 13½ miles northeast of Cantil	W. B. Gerbracht and others, c/o Della G. Gerbracht, P.O. Box 346, Randsburg (1958)	Numerous copper-bearing quartz stringers which trend northwest in Paleozoic metasedimentary rocks.	Eighteen lode claims. Developed by many shallow excavations and short adits. No production. (Dibblee, Gay 52:57t).
88	Gold Peak claims	NE¼ sec. 7, T29S, R39E, MDM, El Paso Mts., 11¼ miles northeast of Cantil, on east side of Mesquite Cyn.	Mrs. Constance Norton and others, c/o Della G. Gerbracht, P.O. Box 346, Randsburg (1958)	Northwest trending copper-stained quartz stringers in Paleozoic metasedimentary rocks.	Five lode claims. Developed by shallow excavations and adits. An idle prospect. (Dibblee, Gay 52:57t).
	Gold Standard prospect	Piute Mts.			A few hundred pounds of copper was recovered from gold ore in the 1930's. See under gold.
89	Grandad group	Approx. center sec. 31 T28S, R39E, MDM, El Paso Mts., 13¾ miles northeast of Cantil, 2 miles southeast of Black Mt.	Katharine Gerbracht and others, c/o Della G. Gerbracht, P.O. Box 346, Randsburg (1958)	Nortn-trending shear in black cherty rocks contains 6-inch-wide, faintly copper-stained quartz vein.	Four lode claims and 2 placer claims. Developed by vertical shaft 60 to 75 feet deep on N.-trending shear and 150 feet to east is S. 35° W.-trending crosscut 75 to 100 feet long. An idle prospect. (Dibblee, Gay 52:57t).
90	Greenback (Weringer) mine	NE¼ sec. 3, NW¼ sec. 2, T26S, R29E, MDM, ¼ mile south of Woody near top of east-trending spur	F. J. Weringer Woody (1956)	Six NE.-trending veins in granodiorite.	See text. (Aubury 05:238; 08:294-296; Brown 16:479; Eric 48:255t; Storms 13:635; Tucker 21:307; 29:22, 23; Turner 02:547, 548).
91	Green Dragon claims	NE¼NW¼ sec. 26, T29S, R38E, MDM, 8 miles northeast of Cantil, near mouth of small canyon on southeast flank of El Paso Mts.	George B. Frasier, Roy E. Cline, 7740 Rindge Ave., Playa Del Rey (1958)	Well-defined quartz vein which occupies a shear zone in quartz diorite. Shear zone strikes N.15° W. and dips 65° SW. Ranges in width from 4 inches to one foot, and can be traced 100 feet along west bank of stream channel. Vein locally contains pods of chalcopyrite and green copper oxides. Largest pod of chalcopyrite is 12 inches in length and depth and 1 inch wide.	Eight lode claims. Vein exposed in several open cuts and trenches. Deepest cut is 10 feet. No production.
	Holland mine				See Apache mine.
	Iron Hat group				See B. Copper and Smith mine. (Dibblee, Gay 52:57t).
	Iron Mt. prospect				See under iron. (Brown 16:480; Eric 48:255t; Tucker 29:56; Tucker, Sampson Oakeshott 49:270t).
92	Jenette-Grant mine	SW. cor. sec. 36, T27S, R33E, MDM, Piute Mts.			Production of some copper ore from a prospect 2½ miles northwest of Jenette-Grant campsite in 1943. See under gold.
	Kelso mine				See text under zinc.
	Layman group				See Colorado Camp group. (Eric 48:255t; Tucker 21:308; 29:23).
93	Lee's copper claims (Copper Basin)	NW¼SW¼ sec. 14, T29S, R38E, MDM, El Paso Mts. 9 miles northeast of Cantil	Mike E. Lee, P.O. Box 105, Randsburg (1958)	Quartz veins in quartz diorite strike NW. and dip 45° - 70° NE. Veins range in thickness from 4 to 6 feet. Crop out in several places on top of hill and are exposed in tunnel.	Four lode claims. Developed by a tunnel 1,872 feet long that extends through the hill. No production. (Dibblee, Gay 52:56t; Tucker, Sampson, Oakeshott 49:208, 253t).
94	Loophole claims	Sec. 32, T28S, R39E, MDM, El Paso Mts., 13 3/4 miles northeast of Cantil	Della G. Gerbracht, P.O. Box 346, Randsburg (1958)	Copper-bearing quartz stringers which trend northwest in metasedimentary rocks.	Four lode claims. Developed by short adit, shallow shafts, and numerous shallow excavations. A prospect; long idle. (Dibblee, Gay 52:57t).
95	Maltby mine	SE¼ sec. 4, NW¼ sec. 10, T26S, R29E, MDM, 1 mile southwest of Woody on Iron Mt.	J. Maltby, Woody (1956)	Copper-bearing vein in schist.	Developed by 35-foot and 16-foot shaft. Several small shipments. (Aubury 05:240; 08:296; Eric 48:255).
96	Manning group	Secs. 7, 18, 19, 30, T28S, R40E, and secs. 12, 13, 14, T28S, R39E, MDM, El Paso dist.	Undetermined, 1957; J. R. Manning, et al., Randsburg (1905)	Copper sulfides and oxidized copper-bearing minerals occur in seams, veins, and lenses in granodioritic intrusive rocks near a northwest-trending contact with metamorphosed sedimentary limestone of the Garlock series (Paleozoic).	Uncorrelated old name; may be property listed herein under different names. Developed by numerous prospect trenches and short shafts (Aubury 05:241; 08:297; Eric 48:255t).
97	Michigan group	N½ sec. 18, T28S, R40E, MDM, Rademacher dist., 9 miles south of Ridgecrest	L. G. Switzer, A. E. Droubie, et al., Los Angeles (1957)	Copper- and iron-stained fracture zones in granodiorite.	Exploration by bulldozer cuts, shallow open cuts, and several old shallow shafts. A prospect.
	Mojave Copper Co.				See under gold. (Aubury 04:19t).

COPPER, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Monday	Reported in sec. 4, T 28S, R32E, MDM, (1904); not confirmed, 1958	Undetermined, 1958; Thede & Sweet, Havilah (1904)	Vein in granitic rock strikes N. 5° W., dips 78° NE.(?). Vein contains quartz, marcasite, and native copper.	Uncorrelated old name. Probably long abandoned prospect. (Aubury 04:13t).
98	Orange Blossom group	Sec. 6, T30S, R38E, MDM, 2 miles northwest of Gypsite siding of Southern Pacific R.R., southeast flank of El Paso Mts.	Formerly Mrs. J. S. Bishop (deceased)	Bornite, malachite, and azurite in shear zones which strike N. 25° W., dip 70° S. in metamorphic and granitic rocks. Copper minerals mostly in 5 lenticular bodies of iron gossan which crop out along shear zone. Gossan outcrops are from 20 to 50 feet long and 6 to 20 feet wide. Placer gold has been found in gravels in gulches below gossan.	Formerly 8 claims; abandoned by Bishop family. Probably listed herein under different name. Developed by 75-foot drift and 85-foot vertical shaft. (Dibblee, Gay 52:58t; Eric 48:256t; Tucker 29:23; Tucker, Sampson, Oakeshott 49:208-209, 253t).
99	Orphan Anne prospect	Approx. center N½ sec. 15, T29S, R38E, MDM, El Paso Mts., 9 miles northeast of Cantil	William C. Miles and others, addresses undetermined (on claim notice dated Feb. 1956)	A quartz vein, 6 to 18 inches wide and a few hundred feet long, occurs in foliated quartz diorite. Vein strikes N. 50° W. and dips 40°-60° E. The principal copper sulfide is chalcopyrite which occurs in irregularly-spaced lenses and streaks a few inches in exposed maximum dimension. Fractures in quartz and walls of vein are moderately- to deeply-stained with copper and iron oxides. Vein is offset 30 feet west a few tens of feet from north end of vein; south part of vein offset 150 feet east. Both faults strike E. Southern part of vein is 2-foot-wide shear zone containing a few stringers of quartz. Average grade of vein is less than 1 percent of copper.	Probably same as Mountain gold prospect. Developed by 50-foot shaft near point of 150-foot offset and numerous crosscut trenches and shallow prospect pits. An old east-driven crosscut adit was driven from the bottom of a small canyon ¼ mile east of main vein to intercept a poorly-exposed quartz vein. No production. Some exploration work about 1956. Idle. (Dibblee, Gay 52:59t).
	Rinaldi and Clark mine				See under lead.
100	Run Around claims	Approx. sec. 13, T29S, R38E, El Paso Mts., 10 miles northeast of Cantil.	Richard D. Weiss and others, addresses undetermined (1958	See Copperola group.	Sixteen lode claims and 1 placer claim adjacent to Copperola group. (Dibblee, Gay 52:58t).
	Schmidt mine				See Smith mine.
	Shamrock	Reported in secs. 2, 10, T28S, R32E, MDM, Clear Cr. dist., near Havilah (1904); not confirmed, 1958	Undetermined, 1958; Shamrock Mining Co. Los Angeles (1904)	Copper sulfides in quartz vein which strikes NE., dips 85° SE.; in granitic rock.	Uncorrelated old name. Probably long abandoned prospect. No recorded production. (Aubury 04:15t).
101	Silverado prospect	Center of north edge sec. 10, T27S, R33E, MDM, east side of Cook Pk., 4 miles east of Bodfish	Everett Hooper, address undetermined (1957)	Shear zone in granitic rocks strikes NW, vertical. Zone is marked by green copper oxides in fractures. Zone reported to contain chalcopyrite and pyrite; averages 1½ percent copper, .02 to .03 oz. gold, and 1 oz. silver by assay (Tucker, Sampson, and Oakeshott, 1949, p. 209). Crops out for about 1,000 feet.	Developed by 40-foot shaft with 20-foot crosscut, 20-foot drift, and several trenches and pits. Probably no production. Idle (Aubury 04:15t; 05:241; 08:297; Brown 16:480; Eric 48:256t: Tucker, Sampson 406:323; Tucker, Sampson, Oakeshott 49:209, 253t).
102	Smith (Iron Hat, Schmidt) mine	N½SE¼ sec. 1, T29S, R38E, MDM, El Paso Mts., 11¼ miles northeast of Cantil, on a small hill a few hundred feet north of road in Last Chance Cyn.	Walter Bickel, P.O. Box 142, Inyokern (1958)	Quartz veins in schist contain chalcopyrite, pyrite, free gold, and unidentified lead minerals. Principal vein strikes west and dips steeply north. Some chalcopyrite and pyrite occur as finely-disseminated grains in silicified blue-gray schist adjacent to quartz. Lead mineralization appears to be in northwest-trending veins approximately parallel to bedding plane shears in schist and carbonate rocks cropping out 100 to 200 feet east of main shaft.	Part of Iron Hat group of 3 claims. Developed by 500-foot shaft which is inclined 70° N. for 200 feet below collar and inclined less steeply north for lower 300 feet. At 50 feet below collar a 90-foot drift adit from east intersects shaft. At an undetermined depth a crosscut was driven several feet to N. from shaft and small room excavated. Several short inclined shafts and adits developed in area 100 to 200 feet east of main shaft. (Dibblee, Gay 52:57t, 58t; Tucker, Sampson, Oakeshott 49:225, 261t).
	Spa and Bonanza	Reported in corner area secs. 3, 4, 9, 10, T26S, R29E, MDM, on Iron Mt. 1 mile southwest of Woody, (1908); not confirmed, 1957	Undetermined, 1957		Uncorrelated old name. Probably abandoned. Prospected by four shafts of undetermined depths. (see Maltby) (Aubury 05:241; 08:296; Eric 48:256).
	Teagle	Undetermined,1957	Undetermined, 1957; C. J. Teagle Johannesburg (1912)		(Eric 48:256t).

COPPER, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
103	Texas Ranger group	S½ sec. 18, sec. 19, T28S, R40E, MDM, Rademacher dist., 9 miles south of Ridgecrest	A. E. Droubie, B. Rose, et al., Los Angeles (1957)	Poorly-exposed copper-and iron-stained fractures in granodiorite.	Ten unpatented claims. Two drift adits driven S. 65° E. and S. 50° E. on fractures, a few tens of feet apart, in southwest part of sec. 19. Numerous cuts by bulldozer and shallow open cuts on other fractures. A prospect; idle.
	Voss properties				See Austin group. (Dibblee, Gay 52: 58t).
	Wall Street				See under gold. (Aubury 04:19t).
	Walsh group				See Colorado Camp group. (Eric 48:256t; Tucker 21:308-309; 29:24).
	Walsh and McClaude group				See Colorado Camp group (Eric 48:256t; Tucker 21:308; 29:23-24).
104	Windy Whiskers claims	Secs. 12, 13 (?), T29S, R38E, MDM, El Paso dist., 10 miles northeast of Cantil, on southwest side of a peak in El Paso Mts.; not confirmed, 1958	George A. Barrington, 1846 E. 70th St., Los Angeles (1958)	Owner reports copper sulfides and copper oxides in veins in granitic rocks. Extent and grade of occurrences not determined.	Three unpatented claims. Development undetermined. No production. Idle.
	Yellow Aster mine				See text under gold (Eric 48:257t).
	Yellow Treasure mine				See under gold. (Eric 48:257t).
105	Zuna (Copperola, Zuna A) claims	NW¼ sec. 12, T29S, R38E, MDM, El Paso Mts., 10½ miles northeast of Cantil, 1 mile southwest of Gerbracht Camp	Rolf L. Meuer and assocs., c/o Della G. Gerbracht, P.O. Box 346, Randsburg (1958)	Quartz vein in shear zone as much as 6 feet wide in foliated Jurassic granite. Vein strikes N. 80° E. and dips 40° NW. sub-parallel to northwest slope of hill. Quartz contains chalcopyrite, bornite copper oxides, iron oxides, and manganese oxides. Vein poorly exposed at surface. Copper staining common in wall rock.	Six lode claims. Principal shaft is near crest of small ridge on south side of Last Chance Cyn. Shaft inclined 40° NW. to depth of 165 feet. Thirty tons of copper-bearing quartz shipped to smelter in Utah in 1941. No other production. Idle. Formerly described under Copperola group. (Dibblee, Gay 52:58t; Eric 48:257t; Tucker, Sampson, Oakeshott 49:208).
	Zundra claims				See Copper Chief group. (Tucker, Sampson, Oakeshott 49:209).
	Undetermined	Undetermined	Undetermined, 1958 B. A. Gordon, Isabella (1943)		Lead mine. Uncorrelated property. (Eric 48:254t).
	Undetermined	Undetermined	G. B. McElhinnie, Bakersfield (1942)		Lead-silver-gold mine. Uncorrelated name (Eric 48:254t).

which averaged 19.4 percent copper and 5.7 ounces of silver per ton (Turner, 1902, p. 547). Little mining was done from 1900 to 1913, but the mine was rehabilitated in 1913 and a 100-ton mill was erected in 1916. Through 1918, production was estimated at 600,000 pounds of copper. Mill ore ranged from 2 to 8 percent copper and contained about 2 ounces of silver per ton, although mill heads average 5 percent copper. No mining has been done since 1918.

The area is underlain by biotite-hornblende granodiorite which contains inconspicuous quartz veins and narrow aplite dikes. Both aplite dikes and veins are cut and displaced along mineralized shears. (fig. 35). The principal copper vein is 5 feet wide, strikes N. 5° E., and dips vertically. From near-surface evidence it appears that an ore shoot was formed at the intersection of the 5-foot vein and a sheeted zone 6 feet wide that strikes N. 70° E. Near the collar of a 200-foot inclined shaft this sheeted zone dips 42° NW. but gradually increases to 60° at a depth of 100 feet. Altered granodiorite at the intersection of these two planes is heavily stained with hydrous iron oxides, and a mixture of azurite and malachite occurs to a depth of 60 feet, the lower limit of oxidation. A limonite gossan 16 inches thick occurs along the hanging wall of the sheeted zone. The sheeted zone is parallel to joint systems in the granodiorite. Both walls of the 5-foot vein are marked by slickensided surfaces with sparse mineralization extending into the wall rock. No primary ore was seen in place in 1956 but material in mine dumps contained massive sulfide ore composed of chalcopyrite with minor pyrite cut by veinlets of sooty chalcocite.

The deposit is developed by a 200-foot single-compartment inclined shaft with levels driven northward at 95-, 135-, and 185-foot depths. A lenticular ore body 20 feet wide and 100 feet in vertical extent was removed from these workings during the earliest period of mining. About 250 feet north of the inclined shaft, two vertical shafts were sunk on a continuation of the same (?) vein. A depth of 240 feet was reached in one shaft, and levels were driven at 100-, 140-, and 200-foot depths with an aggregate of a few thousand feet of drifts. A 200-foot

winze was sunk in the main ore shoot at an inclination of 45° from the 200 level (Tucker, 1921, p. 307). In 1956, timbers in the inclined shaft were in good shape except near the collar; the vertical shaft and appended workings may be open, but are not easily accessible. Other workings include five small prospect pits and a caved adit.

Diatomaceous Earth

By George B. Cleveland

Diatomaceous earth occurs in the extreme western part of Kern County. The principal deposits consist of diatomaceous layers in the early Tertiary marine formations which lie along the western and southwestern margins of the San Joaquin Valley. These formations crop out discontinuously for at least 75 miles in Kern County. In this area the Kreyenhagen shale, Temblor, Monterey (Maricopa shale), Santa Margarita, San Joaquin, and Tulare formations are all diatomaceous in part. The Kreyenhagen shale of Eocene age and the Monterey formation of Miocene age appear to contain the thickest and purest deposits of diatomaceous earth, but none of the deposits has been mined on a commercial basis. These formations trend northwest, are moderately to tightly folded, and locally faulted. Most of the diatomaceous layers are thin, but some are as much as several hundred feet thick. Although the deposits are smaller and appear to be less pure than those mined near Lompoc in Santa Barbara County, they contain large reserves of material which may be of commercial value.

Near McKittrick, Page and others (1945) described scattered and relatively small deposits of asphalt-impregnated sedimentary rocks, some of which are diatomaceous siltstone. Bituminous rocks are distributed widely in this region, but those mapped by Page and others occur in a structural belt that extends for at least 2 miles and is several hundred yards wide. The bituminous diatomaceous siltstone is in the Monterey formation. It is a soft, punky, and weathers white. Fresh surfaces are dark brown. It probably averages less than 10 percent bitumen. The deposits are irregularly shaped and the largest deposit crops out over an area of less than 25 acres. The deposits contain an estimated maximum total of 15,700,000 tons of bituminous material. The thickness of these deposits has not been determined, but estimated reserves of all of the bituminous rocks in the area is based on a thickness of 100 feet and an average bitumen content of about 10 percent. The distribution and size of the bituminous deposits has been controlled largely by shears and solid flow of the sandstones and to a lesser degree by folding.

Bituminous diatomaceous earth deposits similar to those in Kern County are being mined near Casmalia in Santa Barbara County. The bitumen in the rocks is utilized for fuel to calcine the earth which is sold as light-weight aggregate.

Dolomite (See Limestone, Dolomite, and Cement)

Feldspar (See Quartz and Feldspar)

Fluorspar

Veinlets of fluorite occur in an 8-inch-wide shear zone in metarhyolite at a locality in El Paso Mountains. An unconfirmed occurrence in the west end of the Rand Mountains is reported by Murdoch and Webb (1956, p. 157).

Gem and Mineral Localities

Murdoch and Webb (1956) list 119 mineral species in Kern County. In addition, many varieties of quartz-family minerals and other minerals have been gathered in the county and used for cutting and polishing by lapidaries. The localities listed in table 9 are principally sources of material in Kern County for lapidaries. Mineral species listed by Murdoch and Webb (1956) in Bulletin 173, *Minerals of California*, as being found in Kern County are shown in table 10 together with the page number in the bulletin. These were taken from an index prepared by Miss Elizabeth Collins in 1957. No localities containing rare or precious gems are known in the county.

Most of the well-known collecting localities in Kern County contain little easily obtained material, but material suitable for cutting and polishing can be obtained by the diligent worker at most of the localities listed below.

Descriptions and locations of collecting localities in Kern County are available from magazines and books published for the hobbyists. *Treasure map of the great Mojave Desert*, published by *Gems and Minerals Magazine*, Mentone, California (1958), shows the locations of collecting areas. A large part of the information in table

FLUORSPAR - FLUORITE

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
106	Fluorite claims (Last Chance Canyon deposit)	Approx. center of sec. 12, T29S, R38E, MDM, El Paso Mts., 10¼ miles northeast of Cantil	Fred Gerbracht and others, c/o Della G. Gerbracht, P.O. Box 346, Randsburg (1958)	Several veinlets of red, green, and white fluorite in altered metarhyolite. Veinlets occur in 8-inch wide vertical shear zone which strikes N. 55° W.	Five lode claims. Shear zone prospected by several open cuts spaced a few tens of feet apart along the shear zone. No production (Crosby, Hoffman 51:632, 634t).
	Last Chance Canyon deposit				See Fluorite claims. (Crosby, Hoffman 51:632, 634t).

Table 9. Selected gem and mineral localities in Kern County.

No.	Name	Location	Material	Remarks*
A.	Bena Siding	Probably in secs. 1, 12, T. 30 S., R. 30 E., M.D.M., 2 miles east of Bena Siding.	Petrified wood (oak, sycamore).	Silicified wood in upper Walker formation, above a tuff bed.
B.	Black Mountain	S½ sec. 22, T. 25 S., R. 32 E., M.D.M., on Black Mtn. 1½ miles east of Greenhorn Summit.	Smoky quartz crystals.	Large quartz crystals occur in a pegmatite dike intrusive into quartz diorite.
C.	Boron Dry Lakes	Secs. 3, 4, 14, T. 11 N., R. 9 W., M.D.M., 21 miles north of Highway 466, in hills flanking playas.	Petrified wood, "chaffonite" chalcedony.	Silicified woody material in Quaternary lake beds and chalcedony in amygdaloidal basalt.
D.	Cache Creek (Horse Canyon)	Secs. 25, 26, 35, 36, T. 31 S., R. 34 E., M.D.M., in the upper reaches of Cache Creek, about 10 miles northeast of Tehachapi.	Agate (sagenite, banded, clouded, plume, moss, lace), chalcedony, chrysoprase, jasper, mammalian fossils, opal, quartz clusters.	Miocene continental sedimentary rocks flanked on the north by Tertiary andesite.
E.	Cameron Siding	Approx. sec. 35, T. 32 S., R. 34 E., M.D.M., 8 miles east-southeast of Tehachapi, north of Cameron Siding.	Aragonite.	Secondary deposits in Paleozoic limestone.
F.	Castle Butte	Secs. 23, 35, 36, T. 32 S., R. 38 E., M.D.M., 18 miles east-northeast of Mojave, mostly on the southeast slopes of Castle Butte.	Bloodstone, agate, palm root.	Quaternary accumulations of silicified tropical plants mantling Mio-Pliocene continental beds, and amygdaloidal basalt.
G.	Cinco	Sec. 31, T. 30 S., R. 37 E., M.D.M., 4 miles by road north of Cinco, above Water Canyon.	Dipyramidal quartz crystals and twinned orthoclase crystals.	Large, partly kaolinized orthoclase crystals and quartz in a northeast-trending pegmatite dike.
H.	Gem Hill	SE¼ sec. 26, T. 10 N., R. 13 W., S.B.M., 5½ miles northwest of Rosamond, in the Rosamond Hills.	Agate, jasper, nodules, opal, petrified wood.	Secondary deposition of silica, and silicified wood in Mio-Pliocene continental beds.
I.	Greenhorn Summit	Various mines of Greenhorn Summit tungsten district.	Quartz, garnet, epidote, and scheelite crystals.	See Black Mountain King, Little Acorn, and Big Sugar mines in text under *Tungsten*.
J.	Last Chance Canyon	NW¼ T. 29 S., R. 38 E., M.D.M., El Paso Mts., 9 miles northeast of Cantil.	Agate, apatite, calcite geodes, cassiterite, chalcedony, chloropal, copper minerals, coprolites, dendrites, epidote, jasper, opal (fire, moss, resin, milky), petrified wood (palm root, osage orange, black fig, white fig, conifers), zeolites.	Vesicle fillings, veins, etc., in volcanic flows; silicified plant material in Pliocene Ricardo formation; copper mineralization in igneous and metasedimentary rocks.
K.	Pescado Creek	Approx. sec. 12, T. 9 N., R. 17 W., S.B.M. (projected), 8 miles northwest of Antelope aqueduct station.	Varicolored marble.	See Antelope Valley deposit in tabulated list under *Limestone*.
L.	Rainbow Ridge	SW¼ sec. 22 (?), T. 28 S., R. 39 E., M.D.M., 12 miles southeast of Inyokern in El Paso Mts.	Jasp-agate.	Black Mountain vesicular basalt (?).
M.	Rand Mountains	NE¼, T. 30 S., R. 40 E., M.D.M., about 2 miles south of Randsburg.	Rhodonite, tourmaline.	Black tourmaline and sparse rhodonite in Rand schist.
N.	Red Rock Canyon	Mostly in T. 29 S., R. 37 E., M.D.M., along U.S. Highway 6 near Ricardo, along the western boundary of El Paso Mts.	Agate, jasper, natrolite, petrified wood.	Veinlets and vug fillings in volcanic rock of Pliocene Ricardo formation.
O.	Roaring Ridge (Opal mines group)	E½ sec. 13, T. 29 S., R. 37 E., and NW¼ sec. 18, T. 29 S., R. 38 E., M.D.M., northwest flank of El Paso Mts., 7½ miles north-northwest of Cantil.	Brown, gray, and pale white opaline chert, common and fire opal.	Thin layers of chert in tuffaceous silt of member 5 (Dibblee, 1952) of the Ricardo formation. Amygdules of chalcedony and opal as much as half an inch in diameter are in upper basalt flow of the Ricardo formation. Property is developed by 125-ft. shaft inclined 10° to 15° NW. and shallow excavations in the basalt.

Table 9. Selected gem and mineral localities in Kern County.—Continued

No.	Name	Location	Material	Remarks*
P.	Rosamond Rhodonite	T. 10 N., R. 15 W., S.B.M., about 10 miles south of Tehachapi along Cottonwood Creek.	Rhodonite.	
Q.	Saltdale	T. 30 S., R. 38 E., M.D.M., Koehn Dry Lake, 1 mile south of Saltdale.	Halite crystals.	See text under *Salt*.
R.	Sharktooth Hill	Secs. 14, 15, T. 28 S., R. 29 E., M.D.M., 8 miles northeast of Oildale on Pyramid Hill.	Fossil shark teeth and petrified wood.	Silicified wood from Oligocene Walker formation and shark teeth from middle Miocene marine sedimentary rocks.
S.	Soledad Mountain	Sec. 8 (?), T. 10 N., R. 12 W., S.B.M., 6 miles south of Mojave.	Agate, "myrickite," obsidian.	Veinlets in pyroclastic and volcanic rocks of the Tropico group.

* Compiled largely from information in several gem and mineral publications, especially "Treasure map of the great Mojave Desert," by Mary Frances Berkholz (published in 1958 by Gem and Minerals Magazine). Many of these localities were not confirmed by Division of Mines personnel.

9 was kindly provided by Mary Francis Berkholz, field trip editor, *Gems and Minerals Magazine*.

As most of the localities are on private land or land held by mineral location, the collector must obtain permission from the owner to enter the area and remove material.

Gold

In terms of total dollar value and number of deposits, gold is the most important metallic mineral commodity that has been produced in Kern County. From 1851, when it was discovered in Greenhorn Gulch near the Kern River, through 1957, the value of gold mined in Kern County exceeded $46,000,000.

The first lode mining was in 1852 at the Keyes and Mammoth mines at Keysville, and by 1865 gold was being produced from at least four districts in the Kern River country: the Keysville, Clear Creek (Havilah), Greenhorn Mountain, and Cove districts. Gold was so important to the economy of Kern County during this period that Havilah, a remote settlement 7 miles south of Lake Isabella, was the county seat from 1867 to 1874. The gold and silver produced from these districts has been estimated at several million dollars, although no production records are available for the period before 1880. In 1894, gold was discovered on Standard Hill in the Mojave district; through 1958, gold and silver valued at about $20,000,000 was produced from the four isolated buttes that comprise the district. Discovery of gold at the site of the Yellow Aster mine in 1895 led to development of the Rand district and an eventual total yield of at least $20,000,000 in gold and silver.

Two mines, the Yellow Aster mine ($12,000,000 output) in the Rand district and the Golden Queen mine ($9,000,000 output) in the Mojave district have yielded almost half of the total recorded gold output of the county.

Most of the gold veins in the Rand district occupy shear zones and faults in Rand schist (Precambrian?) and Atolia quartz monzonite (Mesozoic). In the Yellow Aster mine, the gold also is in a network or stockwork of closely spaced veinlets, which were mined almost as if they formed a single large vein.

In the Mojave district gold is in veins in Tertiary rhyolitic volcanic rocks, although in some deposits quartz monzonite is the host rock on one or both walls. Associated with gold in the veins are silver, copper, antimony, and lead minerals.

Although most of the gold deposits in the county are in the Sierra Nevada (fig. 36), these deposits have a lower average yield than those in the Mojave Desert region and they are more widely spaced. The nine principal districts in the Sierra Nevada have a combined minimum output of about $7,000,000 in gold. These districts in the approximate order of decreasing productivity according to recorded production are: the Cove, Keysville, Clear Creek (Havilah), Loraine, Pioneer, Piute Mountains (Green Mountain), Poso Creek, Woody, and Greenhorn Mountain districts. Nearly all of the gold deposits of the Sierran mines are in quartz veins in granitic rocks, related alaskite and aplite, and rhyolitic dikes. Other metallic minerals, with the exception of iron sulfides and silver minerals, are generally absent. Scheelite is present in a few veins, and galena, sphalerite, chalcopyrite are common in the Cove district.

In 1958, the only continuous gold mining being done was by a group of lessees at the Yellow Aster mine and the only active custom gold mill (stamp and amalgamation) was the Butte Mill at Randsburg.

Through 1957 the recorded production of placer gold in Kern County totaled about 32,000 fine ounces. The actual output of placer gold, however, is probably two or three times larger, partly because, during the early mining of most of the placer deposits, the miners spent the gold as they mined it. In addition, placer gold is not ordinarily sold to the U. S. Mint and its value is not reported.

Most of the placer gold was mined before 1900 by many miners operating individually or in small mining groups. As soon as the easily recoverable gold was mined at one locality, a period ranging from a few months to about 3 years, most of the prospectors moved to other districts or sought lode deposits upstream or upslope from the placer deposits. Since 1900, the only period

*Table 10. Minerals in Kern County.**

actinolite (amphibole), 41	lazulite, 204
alunite, 38	lead, 205
analcite, 47	lepidomelane, 207
andalusite, 49	litharge, 209
antimony, 53	ludwigite, 210
aragonite, 56	magnesite, 212
argentite, 58	magnetite, 214
arsenopyrite, 61	marcasite, 218
autunite, 64	mariposite, 219
axinite, 65	massicot, 221
azurite, 66	mimetite, 229
barite, 69	minium, 229
benitoite, 74	molybdenite, 231
bismuthinite, 79	montmorillonite, 234
borax, 81, 22	natrolite, 238
bornite, 83	niter, 241
bournonite, 85	opal, 244
bromyrite, 87	orpiment, 245
brookite, 87	orthoclase (feldspar), 155
calcite, 90	phillipsite, 249
cassiterite, 92	piedmontite, 250
celadonite, 94	powellite, 257
cerargyrite, 95	probertite, 259
cervantite, 98	proustite, 259
chalcedony (quartz), 280	psilomelane, 261
chalcocite, 100	pyrargyrite, 264
chalcopyrite, 103	pyrrhotite, 274
chloritoid, 108	quartz, 277
chloropal, 109	realgar, 281
chrysocolla, 116	rhodonite, 284
cinnabar, 120	scapolite, 291
clinoptilolite, 122	scheelite, 292
coccinite, 123	scorodite, 294
colemanite, 124	serpentine, 296
cuprite, 134	sillimanite, 299
cuprotungstite, 135	silver, 300
dolomite, 142	smithsonite, 302
dumortierite, 143	sphalerite, 305
enstatite (pyroxene), 271	sphene, 306
epidote, 146	spodumene, 308
ferrimolybdite, 156	stibiconite, 310
fluorite, 157	stibnite, 311
galena, 160	sulphur, 317
garnet, 164, 166	tenorite, 322
gibbsite (bauxite), 168	tetrahedrite, 324
graphite, 175	thenardite, 326
gummite, 177	thomsonite, 326
gypsum, 178	tincalconite, 328
hematite, 183	torbernite, 330
hemimorphite, 185	tourmaline, 331
heulandite, 186	tremolite (amphibole), 43
howlite, 187	turgite, 336
iddingsite, 191	ulexite, 337
idocrase (vesuvianite), 341	valentinite, 339
ilmenite, 191	vanadinite, 339
inderite, 193	vesuvianite, 341
iron (meteorite), 195	wolframite, 346
jamesonite, 196	wollastonite, 347
kermesite, 199	wulfenite, 349
kernite, 200	zoisite, 353

* As listed in California Division of Mines Bulletin 173 by Murdoch and Webb (1956). Index compiled by Elizabeth Collins, 1957.

during which a large number of placer deposits were being worked was during the late 1920s and 1930s.

Although nearly all the gold districts in Kern County have yielded placer gold, the principal placer deposits are in the Rand district, El Paso Mountains, and along Kern River (fig. 37). In general, the placer deposits were discovered and mined before the discovery of nearby lode deposits, and most of the placer deposits have been traced to lode sources. In El Paso Mountains, however, the source of the placer gold has not been found.

The placer gold deposits are most common in Quaternary stream gravels. The gold is commonly most abundant at or near the base of the gravels. Many of the placer deposits were moderately rich in gold and were mined out within a few years after they were found. Some of the gold placer deposits in the Mojave Desert, however, probably could still be worked profitably if they were near an abundant water supply. The high cost of obtaining water to work the deposits, in the arid region, by hydraulicking, sluicing, or dredging (in artificial ponds) has hindered the mining of the placer material.

Amalie (Amelia, Amalia) Mine. Location: NW¼ sec. 22, T. 30 S., R. 33 E., M.D.M., Loraine district, on a ridge a few hundred feet northwest of the junction of Sand Canyon and Caliente Canyon.

The earliest published record of the Amalie mine was in 1894 when it was owned by C. Mohr of Caliente (Crawford 1894, p. 141). It was purchased soon afterwards and the Amalie Mining Co. was formed. In 1896, a 16-ton Huntington mill was put into operation and development of the mine progressed rapidly until 1900. Mining has been intermittent since 1900, with production reported in 1905, 1908, 1912, 1927, 1928, 1935, and 1936. The total value of ore from the mine was reported to have been about $600,000 by 1912 (Brown 1916, p. 486).

The mine area is underlain by pre-Cretaceous metasedimentary rocks which form a large roof pendant in Mesozoic quartz diorite. Tertiary rhyolite porphyry dikes were intruded into the metasedimentary rocks along a 300-foot-wide zone trending generally northwest. Silver mineralization apparently accompanied a late phase of this intrusion. Quartz diorite crops out 1,500 feet northwest of the main workings and 500 feet to the southeast.

Mineralization is in three subparallel veins 8 inches to 4 feet wide which strike about N. 55° W. and dip 85° NE. The Main vein crops out at the crest of a northwest-trending ridge between Sand Canyon to the east and Caliente Canyon to the south. The vein is mostly in rhyolite porphyry but locally schist forms one or both walls of the vein. It can be traced 600 to 800 feet laterally and has been explored 600 feet down the dip. The vein is composed mainly of fault gouge and quartz with pyrite and hydrous iron oxides. The most common ore minerals are cerargyrite, bromyrite, and free gold, but argentite, proustite, and tetrahedrite were reported by Crawford (1896, p. 605).

The Occidental vein crops out 200 feet southwest of the mine shaft which is on the Main vein. It strikes N. 60° W. and dips 70°-80° NE. The southeastern part of this vein swings northward and appears to join the southeastern end of the Main vein at a point about 550

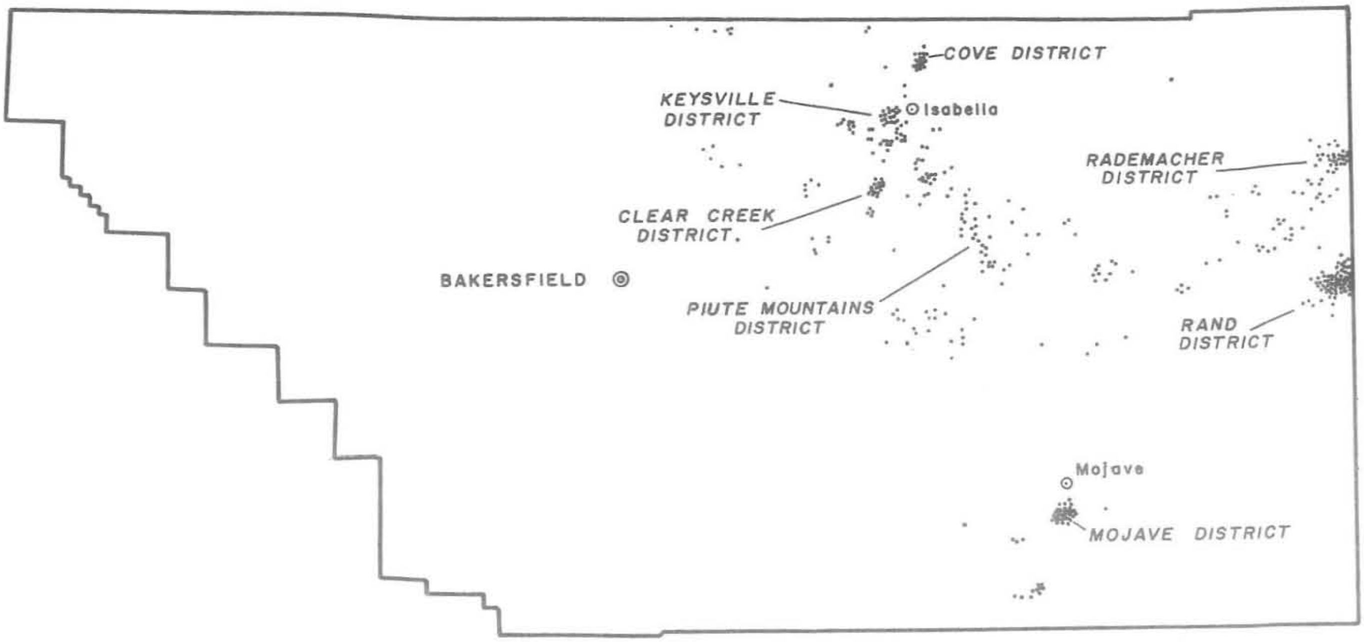


Figure 36. Distribution of lode gold deposits in Kern County.

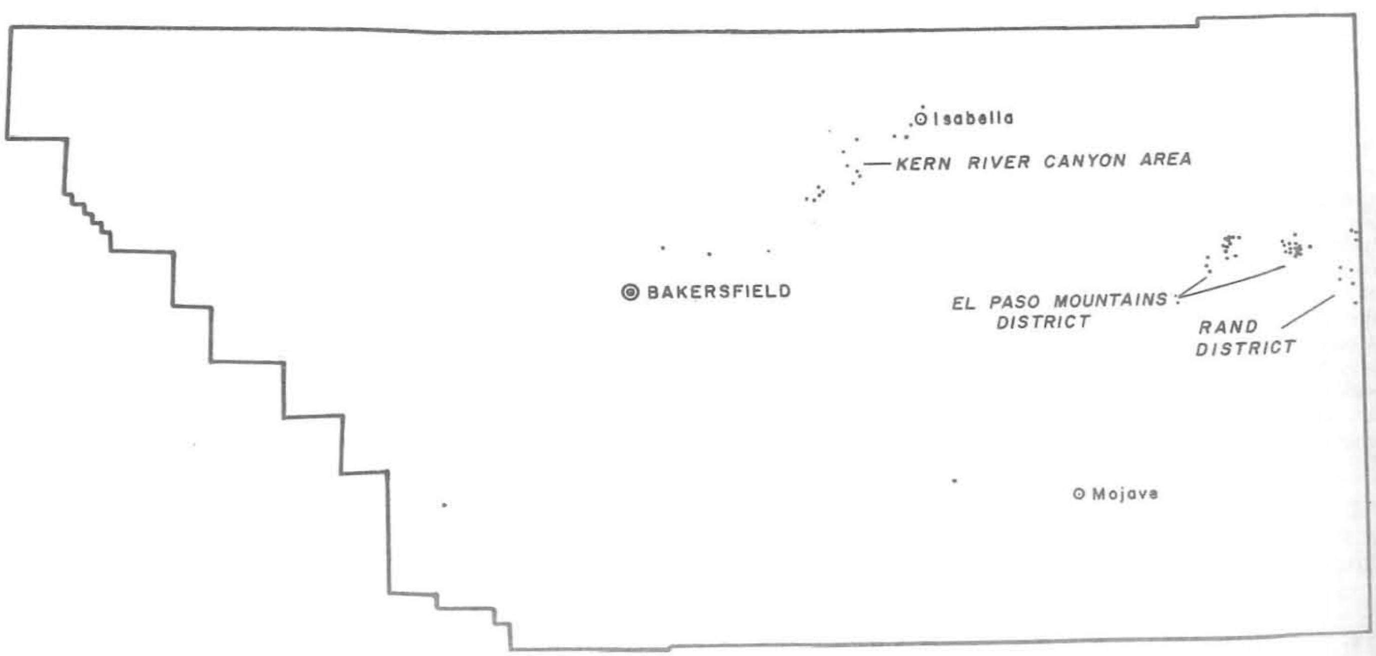


Figure 37. Distribution of placer gold deposits in Kern County.

feet southeast of the shaft. An ore body 200 feet long was mined from the surface to below the 250 level near the intersection of the two veins.

The Virginia vein is about 450 feet northeast of the Main vein. It strikes N. 30° W. and dips 80°-90° NE. It has not been extensively developed.

The Amalia mine workings consist of a 560-foot, two-compartment inclined shaft with six levels at 100, 150, 250, 300, 400, and 500 feet below the shaft collar (fig. 38). Horizontal workings on these levels aggregate about 5,000 feet. The 250 level, with 2,000 feet of workings on the Main and Occidental veins, is the most extensive, and is the only level on the Main vein accessible by an adit; its portal is 800 feet southeast of the shaft, at the southeastern base of the ridge. The Virginia vein is developed by a 240-foot drift adit driven N. 30° W. from the south slope of a small draw northeast of the shaft on the Main vein.

Baltic Mine. Location: SE¼ sec. 1, T. 30 S., R. 40 E., M.D.M., Stringer district, 1½ miles southeast of Randsburg. Ownership: E. D. and Vivian Horkheimer, address undetermined (1957).

Gold was discovered at the Baltic mine site in January 1896, by William and Wilson Logan. It was mined by lessees until 1901. The Baltic Co. operated the mine from 1901 until 1920. The Rand Mining and Milling Co. acquired the mine in 1921 and operated it until 1923. The Monarch Rand Mining Co. owned the mine in 1924; Albert Ancker was the owner in 1933. The mine probably has yielded at least $50,000 in gold. A moderate amount of scheelite, which was discovered shortly before World War I, also has been produced. The most productive gold-mining period was from 1896 until 1912; minor production was obtained during the years 1920-22, 1933, 1935, 1938, and 1940. A 10-stamp mill was operated for many years on the Baltic property. A large part of the mill tailing has been re-milled. Part of the mill was set up at the Randsburg museum in 1958.

The gold and scheelite are in two intersecting fault lode veins in Rand schist. One vein strikes N. 20° E. and is aligned with the G. B. vein, which was mined a few hundred feet to the north of the Baltic mine. The other vein strikes nearly due west and dips 35° N. Both veins are from 2 to 4 feet wide and each has been traced for about 500 feet on the surface. Several west-trending veinlets or stringers only about an inch wide also contain traces of gold and locally are rich in scheelite. The veins and stringers are composed of silicified, iron-stained, brecciated Rand schist and contain finely divided gold, locally scheelite, and, in some places, minute crystals of pyrite. Nearly all of the alluvial material in the stream channel which drains eastward across the Baltic claim has been removed and treated for the recovery of scheelite and gold. Soon after the discovery of the scheelite in the alluvium, abundant pebbles and cobbles of scheelite were hand-sorted from it.

The principal mine workings are joined to the Old Baltic shaft at the intersection of the two main veins and to the New Baltic shaft about 600 feet to the north along an unproductive vein. The Old Baltic shaft is inclined 35° N. to a depth of 160 feet. From it several hundred feet of drifts have been driven on both veins on three levels down to 160 feet and numerous stopes, some now caved, have been the principal sources of ore. The New Baltic shaft is 610 feet deep on a 65° incline and has a total of 230 feet of drifts on the 300-foot and 580-foot levels. Several other shafts, some as deep as 75 feet, have been sunk on some of the stringers.

Barbarossa Mine. Location: Mostly in the SW¼ NE¼ sec. 16, T. 30 S., R. 33 E., M.D.M., Loraine district, one mile north of Loraine on a high ridge between Sand and Sycamore Canyons. Ownership: Christopher Rosenhoffer, 277 Douglas, Pasadena (1958).

The Barbarossa mine was worked mostly during two periods in the early 1900s. In 1904 approximately 2,000 tons of ore was mined, and an additional 900 tons was shipped between 1912 and 1914. The ore averaged one ounce of gold and one ounce of silver per ton. Ore was hauled by wagon to the Amalie mill one mile south of the Barbarossa mine. The mine has been idle, except for development work, since 1914.

The ore was obtained from the Barbarossa vein which is contained in a porphyritic rhyolite dike a few tens of feet thick and trending N. 5° W. The dike has intruded Mesozoic quartz diorite. The vein is 2 to 6 feet wide, strikes N. 35° W., dips 50° to 70° NE., and can be traced about 400 feet on the surface (fig. 39). The south end of the vein is terminated by a fault which strikes N. 25° E. and dips 58° NW.; the north end apparently splits into several small fractures which can be traced only a few feet farther northwest. Porphyritic rhyolite forms both walls of the vein at the surface but at some points underground quartz diorite forms the footwall. The vein walls are well-defined faults which pinch and swell abruptly. The vein is composed principally of quartz with sparsely disseminated fine-grained pyrite; free gold and an undetermined silver mineral are the only ore minerals.

A single-compartment 137-foot inclined shaft extends from the surface to the upper or Finley level at 70 feet and the middle level at 137 feet. These two levels aggregate more than 700 feet of drifts and crosscuts. The upper level is also accessible by a 110-foot crosscut driven N. 70° W. from a point 130 feet east of the collar of the shaft. From the 137-foot level the vein on both sides of the shaft has been mined about equal distances to extract an ore body 160 feet long and 4 feet wide.

A lower level was developed from a point 370 feet southeast of and 208 feet below the portal of the upper level. It consists of a 416-foot crosscut adit driven N. 80° W. and about 1,000 feet of appended lateral workings driven in an attempt to find other ore bodies. Although additional veins were found in these lower workings none was of sufficient grade to mine at a profit. Another crosscut adit 330 feet northeast of the upper portal was driven 145 feet S. 45° W. toward the 137 level, but lacks 145 feet of connecting with it.

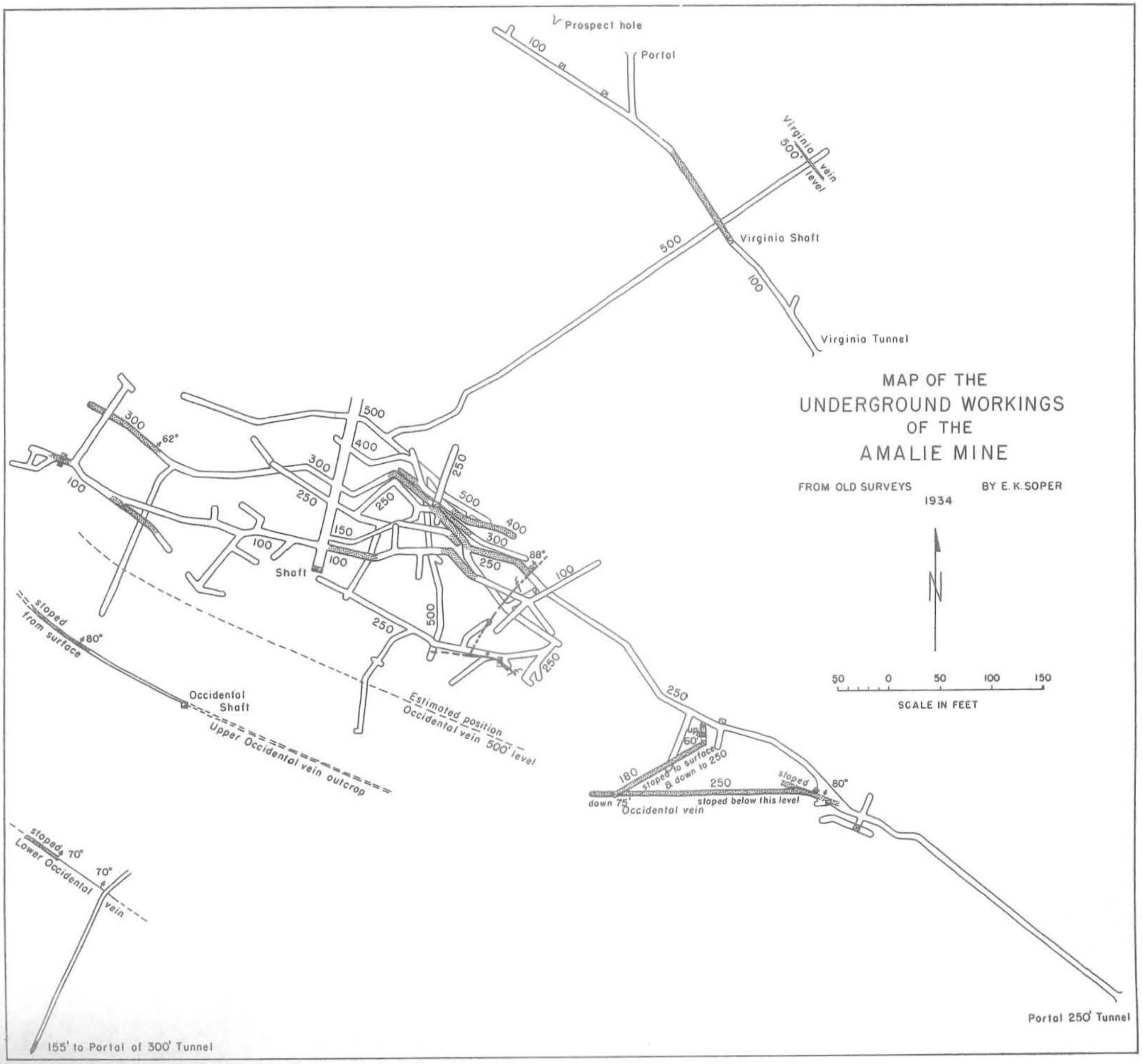


Figure 38. Composite plan of the Amalie mine.

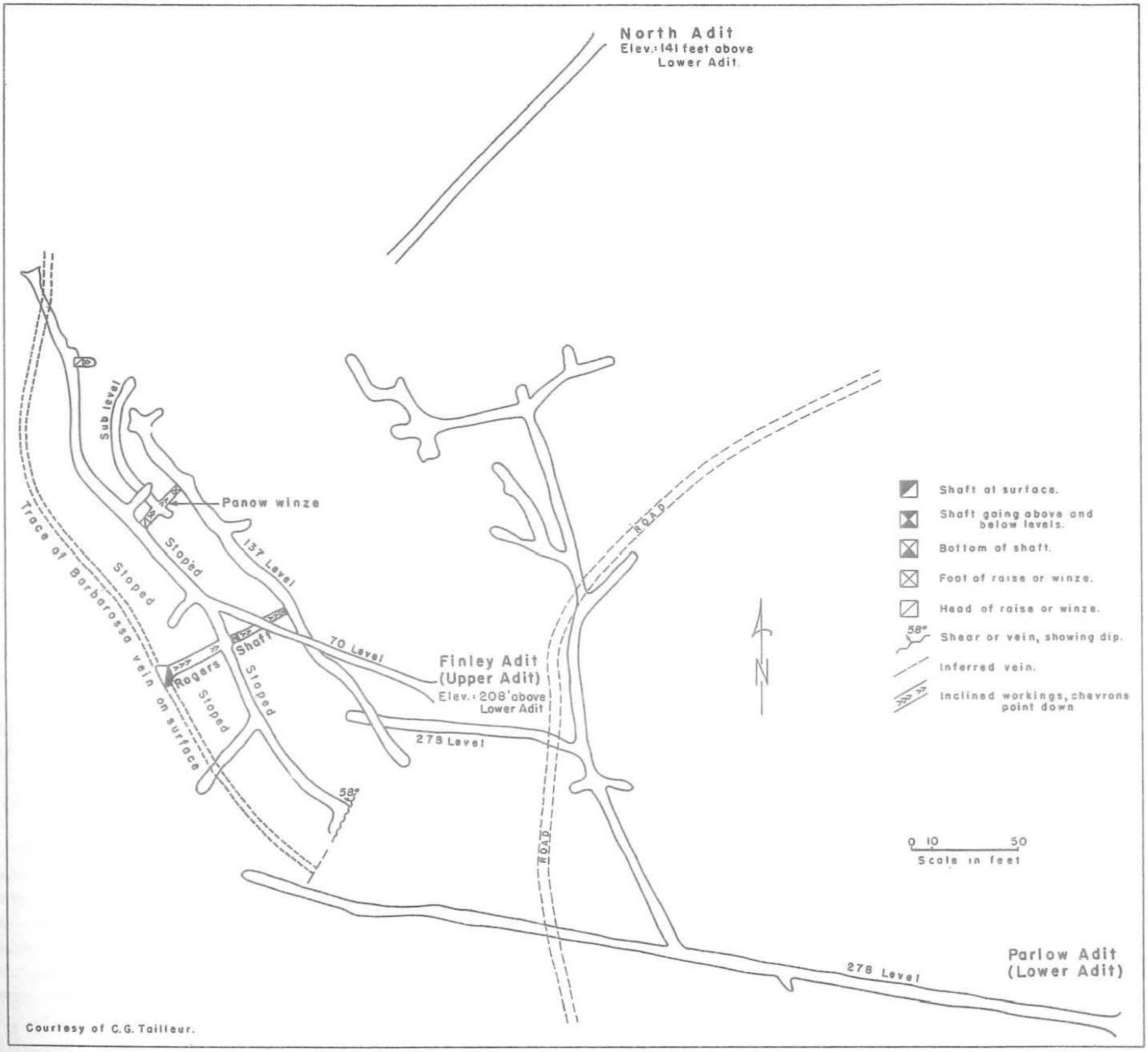


Figure 39. Composite plan of the Barbarossa mine.

Big Blue Group * *(Includes the Beauregard, Big Blue, Blue Gouge, Bull Run, Content, Frank, Jeff Davis, Lady Belle, Nellie Dent, North Extension Sumner, Red Hill, Sumner, Urbana, and other mines and claims).* Location: Most of sec. 28, NW¼ sec. 33, and parts of E½ sec. 21, T. 25 S., R. 33 E., M.D.M., Cove mining district, 1½ miles southwest of new Kernville, on the northwest shore of Lake Isabella. Ownership: Most of the claims are patented and owned by Kern Development Company, C. S. Long, president, Box 157, Hayward; leased to Kern Mines Company, Roland Tognazzini, president, 260 California St., San Francisco (1955).

* By Thomas E. Gay, Jr.

Lode gold was discovered in the Cove district by Lovely Rogers in 1860 in the area now occupied by the Jeff Davis, Lady Belle, Bull Run, Frank, Urbana, and Beauregard claims. Rogers, Thomas J. Oders, and Joseph Caldwell formed the Beauregard Mining Company, and erected an eight-stamp mill with wooden stamps. Other discoveries of gold were made in the surrounding area, and by 1870 several mines were in operation. Most of these mines were consolidated in 1875 by Senator J. P. Jones who established the Sumner Gold and Silver Mining Co. A 16-stamp mill was installed and later enlarged to 80 stamps as daily production from the mines was increased. The mine was shut down in 1883 follow-

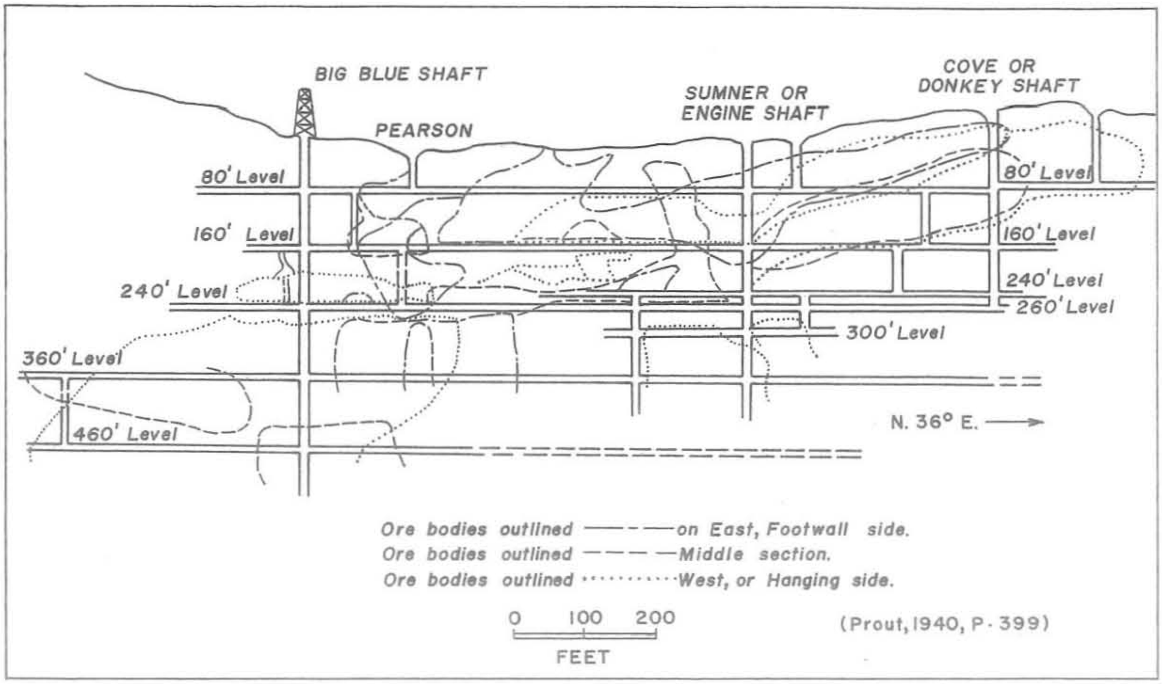


Figure 40. Longitudinal section along strike of the Big Blue—Sumner mineralized shear zone.

ing destruction by fire of the surface buildings and near-surface timber in the upper workings of the mine (Prout, 1940, p. 384). Attempts by lessees to restore the mine to productivity were unsuccessful. Kern Development Company, the present owner, acquired the property in 1907. From 1935 to 1943, Kern Mines, Inc., carried on extensive development and mining activities which resulted in a production of several hundred thousand tons of ore yielding an average of 0.11 oz. of gold and 0.10 oz. of silver per ton plus 6,500 pounds of copper and 69,000 pounds of lead. From 1934 through 1943 recovery of gold, silver, lead, and copper was valued at over $1,200,000. The mine has been idle since 1943. No reliable production figures are known to the writer but the production has been estimated to be several million dollars (Prout, 1940, p. 384).

The Big Blue mine area is underlain by pre-Cretaceous rocks of the Kernville series, Mesozoic granodiorite, and later Mesozoic alaskite and aplite dikes. The Kernville series includes metasedimentary rocks preserved as roof pendants in the granodiorite, and in the mine area, is composed of gray mica schist, dark gray to black slaty phyllite, light-yellowish thinly bedded quartzite, and white recrystallized limestone. Medium-grained granodiorite crops out in most of the area to the west and to the east of the mineralized zone in metasedimentary rocks. The alaskite is a fine-grained foliated rock which crops out in a dike that trends generally northeast parallel to the main or Big Blue-Sumner shear zone. It is about 1,500 feet wide and is several thousand feet long, extending mostly along the east side of the shear zone. Aplite is intrusive into the alaskite in numerous 2- to 4-foot-wide branching interconnecting dikes. The aplite was followed by intrusion of silexite, a very fine-grained, bluish colored siliceous rock (Prout, 1940, p. 388).

The principal vein system, the Big Blue-Sumner shear zone, is a sheared and faulted zone, as much as 125 feet wide, that strikes N. 30° E., and dips 70° NW. This zone, also known as the Big Blue or Sumner lode, is traceable on the surface for more than 8,000 feet; its southern half is along a contact between granodiorite and alaskite, and the northern half coincides with contacts between alaskite, granodiorite, and metamorphic rocks (fig. 7). Innumerable subordinate faults, splits, and sheared zones comprise the main shear zone. Post-ore faulting is evident in brecciated and displaced segments of the mineralized "blue" vein quartz. Ore bodies generally coincide with quartz veins in the footwall, hanging wall, and central portions of the shear zone. One of the largest ore bodies was elliptical in horizontal section, 500 feet long, with a maximum width of 60 feet near the center. Ore shoots also are in opened joints in both the footwall and hanging wall country rocks adjacent to the main shear zone.

A second vein system lies west of the Big Blue-Sumner shear zone. It strikes N. 60° E., dips 60°-80° SE. and terminates against the northern portion of the Big Blue-Sumner shear zone. This system of veins, which is designated the Lady Belle system, traverses alaskite and granodiorite. The belt containing these veins is about 700 feet wide perpendicular to the veins and 1,200 to 1,400 feet long. In general, ore bodies in this system are shallower, shorter, and richer than those of the Big Blue-Sumner shear zone. The average width of ore bodies in the Lady

Belle vein system is 2 to 4 feet, and the average grade for much of the ore was from $12 to $20 per ton.

Ore bodies of both systems are composed principally of "blue" vein quartz containing very fine to coarse free gold ranging from 650 to 700 fine. At least 50 percent of the gold particles are associated with sulfides, especially arsenopyrite, pyrite, galena, and sphalerite; less commonly gold is enclosed in these sulfides. Other metallic minerals present in the ore are marcasite, pyrrhotite, scheelite, molybdenite, stibnite, bismuthinite, chalcopyrite, and silver chlorides. The nonmetallic gangue minerals are calcite, sericite, chlorite, barite, and albite. Wall rocks have been altered by sericitization, chloritization, and albitization.

More than a dozen shafts have been sunk during different periods of development of the Big Blue group. The most important of these are the Sumner or Engine shaft (fig. 40), the Cove, Pearson, Big Blue, and Lady Belle shafts. The Sumner shaft, the first shaft sunk, is near the south end-line of the Lady Belle and Big Blue-Sumner vein systems. This shaft was sunk to a depth of 400 feet with levels at depths of 80, 160, 260, and 300 feet. This is the shaft that was destroyed by fire in 1883. The Cove shaft, 350 feet northeast of the Sumner shaft, was sunk to 240 feet and contained three levels. The Pearson shaft, in Big Blue Gulch 500 feet south of the Sumner shaft, was 80 feet deep and connected with the original Sumner shaft workings. The Big Blue shaft, the principal shaft, is 510 feet deep and was sunk 650 feet south of the Sumner shaft. Drifts were extended to the oldest workings of the Sumner shaft on the 80, 160, and 260 levels and also on the 360 and 460 levels. The 360 level extends more than 1,000 feet north of the shaft and intersects four ore shoots which range in width from 4 to 60 feet, and are 200 to 540 feet long. The 460 level contains over 1,000 of drifts and crosscuts, mostly north of the shaft. The Lady Belle shaft, the principal shaft of the Lady Belle system of veins, is 438 feet deep and provided access to about 2,500 feet of drifts (Aubury, 1904, p. 12).

Four crosscut adits connect with the Big Blue-Sumner vein from the east. The North "tunnel", 500 feet northeast of the Cove shaft, was driven a few hundred feet west from Sumner Gulch to the 160 level workings. The Pioneer "tunnel", driven west to the vein near the Sumner shaft, served as a haulage level. The Big Blue "tunnel" was driven 2,000 feet west from a point near Kern River to the Sumner shaft. This adit was originally driven to drain the 260 level. It is now part of the property acquired by the U. S. Army Corps of Engineers for the Lake Isabella flood control project, as is the mill site, and both are beneath the spillway level of the lake. The fourth adit, known as the Graveyard or South "tunnel", is about 1,100 feet southeast of the Big Blue shaft. It was driven 500 feet west to the Big Blue-Sumner vein.

The total number of feet of horizontal workings in the Big Blue mine has not been determined, but earlier reports (Prout, 1940, p. 417, 419) suggest that at least 30,000 feet of horizontal workings have been driven on the Big Blue-Sumner vein. The extent of the workings in the Lady Belle system are even less well known. They probably aggregate a minimum of 10,000 feet (see also the Cove mining district).

Big Dike (Big Dyke) Mine. Location: NW¼NW¼ sec. 1, T. 30 S., R. 40 E., M.D.M., Rand district, half a mile south of the east end of Randsburg, about 100 yards west of the paved road in Fiddlers Gulch. Ownership: Five unpatented lode claims are owned by the J. D. O'Shea estate, Benko brothers, Portage, Pennsylvania, and Mrs. M. O. Miller, Los Angeles (1958).

The total output of gold from the Big Dike mine is probably several thousand ounces, valued at about $200,000. Most of the gold was produced between 1929 and 1950. The average gold content of about 10,000 tons of ore was slightly less than half an ounce per ton. The gold averages about 930 fine. Some production of ore from the Big Dike mine may have been credited to the Yellow Aster Mining Company's production record during its operation of the mine sometime before the mid-1930s. Practically all of the gold from the Big Dike mine was produced by lessees of the mine. Only assessment work has been performed on the mine property since 1950.

The veins at the Big Dike mine are in Mesozoic quartz monzonite and in an east-trending rhyolite dike of Tertiary age which is several hundred feet long. Schist forms

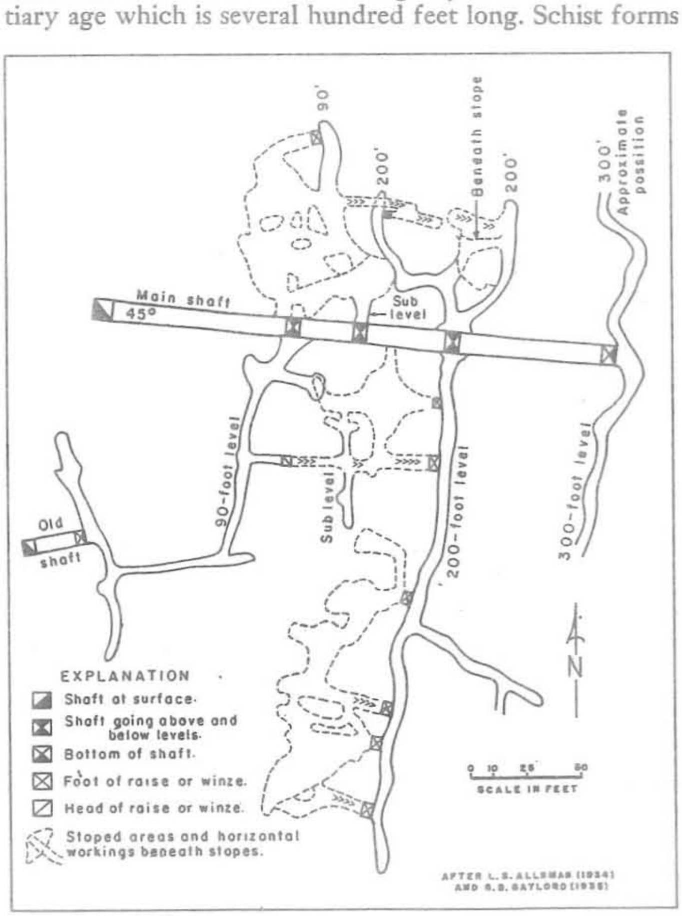


Figure 41. Composite plan of the Big Dike mine.

the wall rock along parts of the veins but is not exposed at the surface. The principal vein occupies a fault zone which strikes approximately north and dips an average of 40° E. It has been traced for a distance of a few hundred feet along the surface but is poorly exposed. The vein ranges in thickness from a few inches to several feet. The southern part of the vein crosses the east-trending rhyolite dike with no apparent displacement of the dike. The vein is composed of brecciated and silicified wall rock and lies between a well-defined hanging wall shear and a moderately to poorly defined footwall shear. Gold is in very small, free particles, most commonly near the hanging-wall shear, and in ore shoots at the intersection of footwall fractures and the main vein. Some of the numerous minor shears between the two walls contain streaks rich in gold. Most of the mined ore shoots are several tens of feet long both laterally and down dip, and probably average about 2 feet in thickness.

Most of the workings of the Big Dike mine are drifts on three levels which extend north and south from a 300-foot shaft inclined 45° east (fig. 41). The three levels are at inclined distances of 90, 200, and 300 feet from the collar of the shaft. A sub-level extends north and south from the shaft between the 90 and 200 levels. A crosscut extends west into the footwall from the south end of the 90 level to workings of an old inclined shaft about 150 feet southwest of the collar of the main shaft. Other crosscuts were extended both east and west from all three levels. From the shaft, the 90 level extends 200 feet south; the 200 level extends 200 feet north and 200 feet south; and the 300 level extends 100 feet north and 200 feet south. The vein was stoped from the 300 level to the 90 level for 200 feet south of the shaft. North of the shaft the vein was stoped from the 200 level to approximately the 100 level for 100 feet.

Several other short shafts have been sunk on the main vein and a drift adit was driven northward several tens of feet on a weakly mineralized shear zone several hundred feet southwest of the main workings.

Big Gold (Big Tungsten, Bi-Metallic, West End) Mine. Location: secs. 3 and 4, T. 30 S., R. 40 E., M.D.M., 1½ miles southwest of Randsburg, on the northwest flank of Government Peak, Rand Mountains. Ownership: John Kreta and Helen V. Kreta, P.O. Box 251, Randsburg, own five unpatented claims (1958).

The Big Gold deposit was discovered in 1898 and was worked intermittently until 1923 by which time a 384-foot vertical two-compartment shaft had been sunk and more than 500 feet of horizontal workings had been driven, mostly at the 155-foot level. Since 1923 the principal periods of activity have been 1927-28 and 1940-42. The total value of the output of gold and silver is estimated by John Kreta (personal communication) to be nearly $500,000. The ore is valued mostly for its gold content. An undisclosed amount of tungsten was yielded from the mine.

Gold occurs in fault zones and shear zones that cut Rand schist and quartz monzonite. The principal fault

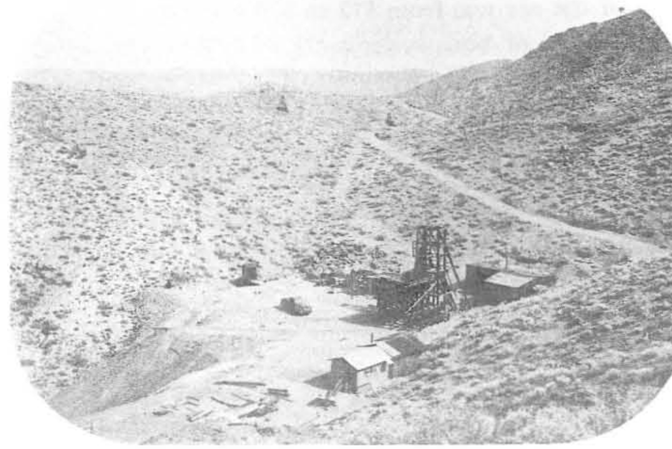


Figure 42. View to northeast of the Big Gold mine. Vein dips away from observer from point where photo was taken. Vertical shaft extends downward through hanging-wall block to vein. Minnehaha mine is in background.

zone, the Big Gold fault, strikes N. 20° W., dips 40° NE., and separates quartz monzonite on the east from schist on the west. The fault can be traced on the surface half a mile south from the mine workings. A parallel gold-bearing shear zone is in quartz monzonite about 20 feet east of the Big Gold fault on the 155-foot level of the mine. Two east-trending shear zones are exposed a few hundred feet south of the main workings.

The Big Gold fault zone is about 4 feet in average width and consists of crushed and brecciated schist, quartz, and rhyolitic dike material between well-defined walls. Locally the fault zone is as much as 30 feet wide (Helen Kreta, personal communication, 1959). Gold is most commonly in free, very small grains along the footwall. Gangue minerals are iron pyrites, oxidized in the upper part of the veins, and quartz, which occurs most commonly as a siliceous matrix in brecciated schist. Scheelite is present along parts of the fault zone, most commonly near the hanging wall. Copper sulfides have been found, and tellurium is also reported (Hulin, 1925, p. 130), but both are extremely rare. The gold content of most of the ore mined ranged from 0.25 ounce to more than an ounce per ton, but locally, extremely high-grade, small ore shoots have been found (John Kreta, personal communication, 1957).

The Big Gold mine is developed by a two-compartment vertical shaft, now 384 feet deep, with levels at 90, 120, 155, 170 and 250 feet (figs. 42, 43). Most of the level workings extend south of the shaft. The shaft has been back-filled from a depth of 650 feet (Helen Kreta, personal communication, 1959) to the 384-foot level. Most of the mining has been done from the 155-foot level where the Big Gold fault was intersected by the shaft. The 155-foot level extends 200 feet south and 30 feet north from the shaft; the vein was stoped for 40 feet along strike across a 12-foot width southward above the drift. Near the shaft a winze was sunk 105 feet on the vein at an incline of 40°. Eighty feet south of the

shaft, a 25-foot crosscut was driven east from which a drift was driven 47 feet south on a vein east of the Big Gold vein. From the 25-foot crosscut a 30-foot winze was sunk on a 45° incline from which a sublevel was driven 105 feet southward along the vein east of the Big Gold vein. Along the most southerly 85 feet of this drift an underhand stope has been driven 35 feet down dip. At the north end of the drift a 42-foot winze was sunk down-dip, and a drift was driven northward from the winze. The 250-foot level consists of an 85-foot crosscut east from the shaft then a 90-foot drift south on the Big Gold vein.

Two adits have been driven along the footwall of the Big Gold fault about 400 feet west of the shaft. One adit extends 175 feet S. 10° E. on the vein; the other is a west-trending crosscut which intersects the vein at 40 feet from the portal. From this point a 60-foot drift was extended south and a 55-foot winze was sunk down-dip. Several other short adits and shallow shafts have been made on iron-stained shear zones in an area a few hundred feet south of the mine area.

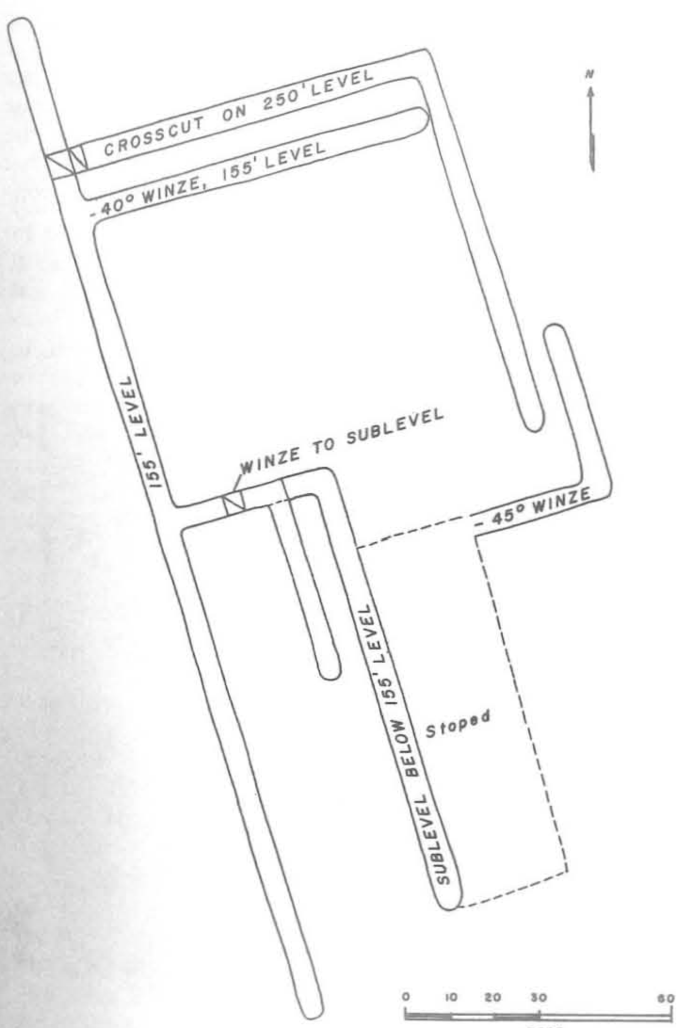


Figure 43. Composite plan of the Big Gold mine.

Bobtail Mine. Location: SW¼ sec. 6, T. 10 N., R. 12 W., S.B.M., Mojave district, 5 miles southwest of Mojave, on the lower southwestern flank of a N. 45° W.-trending ridge in the northwest part of Soledad Mountain. Owner: Mrs. D. McAllister, Mojave (1958).

The Bobtail vein was discovered about 1900 and has been mined intermittently since 1902. Total production exceeds $50,000 and has been estimated to be as much as $100,000 (Julihn and Horton, 1937, p. 24). More than 80 percent of the total production was mined between the years 1923 and 1942. During this period the ore mined averaged 0.52 ounces of gold and 0.33 ounces of silver per ton. The earliest recorded shipment, in 1902, consisted of 250 tons of ore which contained an average of 1.3 ounces of gold per ton. Between 50 and 60 tons of ore were mined during 1949-51, but the mine was idle in 1958.

The ore was mined from a quartz vein designated the "Bobtail" vein, which strikes N. 40° W. and dips 80° NE. in flow-banded fine-grained rhyolite; on the 150 level of the mine the dip of the vein flattens to 50°. The vein can be traced for more than 1,000 feet laterally and has been worked to a depth of 200 feet. It consists principally of brecciated and recemented limonite-stained quartz containing fine free gold, cerargyrite, and argentite. On the Excelsior claim of the Elephant group to the southeast, this vein is known as the "Excelsior" vein.

The vein has been developed by a 150-foot inclined shaft with levels at 60, 100, and 150 feet. A stope 150 feet long has been driven to the surface from the 150-foot south drift on the 100 level, and another stope on the 60 level has been mined to the surface along a length of 60 feet. The 150 level consists of a 50-foot drift both north and south of the shaft. A few hundred feet north of the shaft, a crosscut adit was driven eastward that intersected the Bobtail vein at 15 feet and the Elephant vein of the Elephant group at several hundred feet. A drift was driven 200 feet to the southeast on the Bobtail vein, along 175 feet of which the vein has been stoped to the surface.

Burton-Brite-Blank (Brite-Burton) Mine (now part of *Middle Butte Mine*). Location: NW¼ sec. 16, T. 10 N., R. 13 W., S.B.M., Mojave district, 9 miles northwest of Rosamond on a northeast-facing slope of the southeastern part of Middle Butte. Ownership: The west half of the section is owned by Middle Butte Mining Co., Inc., c/o Emory L. Morris and Mary Johnson, San Francisco. Martin Beck of Rosamond has a lease on the property. In 1958 a sublease was issued by him to James and Victor Wright of Rosamond.

The Burton-Brite-Blank deposit was discovered on privately owned land in January 1934 by Clyde Westfall. A few months later, the northwest quarter section was acquired by C. Burton, E. Brite, and T. H. Blank who, within a few days gathered high-grade float material which yielded $20,000 in gold. Although subsequent

exploration led to the discovery of a 5-foot-wide vein, no comparable ore was found in place. The mine was idle from 1942 to 1958, but early in 1958 two sub-lessees were investigating the possibility of jigging the minus ⅜-inch fraction of the surface material.

Most of the ore mined to date has been obtained from open cuts in landslide debris which covers an area about 500 feet in diameter. Presumably, this material slid northward down the slope from outcrops of the main vein of the Middle Butte mine. An extension of this vein was found, outside the slide area, in a crosscut adit 500 feet north of the vertical shaft which is on top of the ridge at the south end of the old lease. However, only small irregular and discontinuous ore shoots of low grade were encountered underground. The vein is 4 to 6 feet wide, strikes N. 25° W. and dips 40° northeastward. It consists of a mixture of kaolinite, alunite, and quartz with hydrous iron oxide staining. Ore minerals consist principally of free gold and minor amounts of unidentified silver minerals.

Underground workings consist of two adits and a 65-foot vertical shaft with a level at the bottom driven southeastward. The length of the level was not determined, but it is reported to have connected with Middle Butte mine workings (Tucker and Sampson, 1935, p. 471). One adit, about 500 feet north of the shaft and 130 feet below the collar, was driven 165 feet southwest; the second adit was driven 400 feet southwest from a point 160 feet below the first adit.

Butte (Big Butte, Butte Lode, Butte Wedge) Mine. Location: SW¼ sec. 36, T. 30 S., R. 40 E., M.D.M., at east end of town of Randsburg. Ownership: Butte Lode Mining Co., P.O. Box 195, Randsburg, Bert Wegman, pres., Louis Meehl, sec., owns five claims (1958).

The Butte gold deposit was discovered in 1896 by three brothers—H. C., Sommers, and Tate Ramie. By 1899, when the Butte Lode Mining Co. was formed, ore valued at approximately $140,000 had been produced. The most productive mining periods were 1896-1912, 1916-21, and 1925-42. Most of the mining was done by lessees; the ore being milled by the owners. During the depression years of the 1930s, when several groups of lessees covered nearly all of the mine, one group swept fines from the floors of stopes and milled them. The mine has been idle since 1942 except for a few short periods when the prospecting of old workings has yielded small lots of ore.

Total production from the mine is nearly two million dollars in gold and silver, and a few units of tungsten concentrates (Bert Wegman, personal communication, 1957). Wegman estimates that the average grade of the ore has been 0.75 ounce of gold per ton; the highest grade block of ore mined was 75 tons that yielded 7 ounces of gold per ton. Vein material that contained less than 0.25 ounces of gold per ton was put in the mine dumps and part of this has since been screened and the fines have been milled. Wegman (1957) estimates that the fines in the unscreened portions of the dumps con-

Figure 44. View to northeast of the Butte mine. Surface trace of Butte mine lies at heads of all the dumps, extends to viewer's left into the Little Butte mine and to right into the King Solomon mine. Butte mill is at upper end of the pale-colored tailings.

tain about \$6 per ton in gold. Each year he usually mills a maximum of a few tens of tons of the screened material. The dumps in 1957 contained several thousand tons of unscreened rock.

Mesozoic quartz monzonite underlies a small part of the southeast portion of the mine area. Precambrian? Rand schist underlies most of the rest of the area. Tertiary? diorite, which is in a continuous dike several feet wide and extends three-quarters of a mile southeast and a mile northwest of the Butte mine, forms the hanging wall of most parts of the principal or Butte vein. The general strike of the diorite dike and the Butte vein is N. 50° W.; they dip about 45° NE. The Butte vein is about 1,800 feet long on Butte Lode Mining Co. property and extends several hundred feet farther northwest into the Kenyon (Consolidated) and Little Butte mines (fig. 44). It also extends southeastward into the King Solomon mine. In the Butte mine, the Butte vein ranges in thickness from a few inches to several feet and extends to an inclined depth of 500 feet. Another vein in the hanging wall block of the Butte vein extends from a junction with the Butte vein S. 70° E. into the King Solomon mine (pl. 4). It resembles the Butte vein in thickness and composition and crosses the diorite dike southeast of the junction with the Butte vein. It has been mined in both the Butte and King Solomon mines.

Most of the vein material in the Butte mine is silicified, iron-stained, and brecciated rocks of the footwall block—Rand schist, diorite, or quartz monzonite. In some parts of the mine the wall rock is so altered and bleached that it cannot be readily identified. The material in both veins lies between a well-defined hanging wall shear and a poorly defined footwall shear. Gold, mostly in the form of fine, free particles, is most common in the footwall of the vein adjacent to the hanging wall shear and is progressively less abundant toward the footwall. Sulfides, principally fine-grained pyrite, have been found in the relatively uncommon unoxidized parts of the veins. Scheelite has been found in the footwall of the Butte vein at one point on the 250-foot level west of the Rand shaft (pl. 4).

The three principal ore bodies are in the Butte vein. The largest is in the southeast part of the mine and lies adjacent to a change in strike of the Butte vein northwest of the intersections of well-defined footwall shears or faults. This ore shoot has been mined from above the 65-foot level to the 500-foot level below which the gold content decreases. The strike length of the ore shoot, which rakes southeast, is about 100 feet on most levels and the shoot ranges in thickness from 2 feet to about 8 feet.

A second ore body, which lies about 80 feet northwest of the upper part of the southeast ore body, is at the junction of the Butte vein and the vein that extends farther southeast into the King Solomon mine. This ore body has a strike length of about 150 feet and extends from a point above the 65-foot level to the 165-foot level and also appears to pinch out downward.

The third ore body is a few tens of feet northwest of the middle ore body on the opposite side of a cross fault which has displaced the northwest segment of the Butte vein northward. This body is about 250 feet in strike length and extends from above the 165-foot level to below the 300-foot level.

The Butte mine comprises more than 12,000 feet of horizontal workings on nine levels, three large stopes, and seven shafts (pl. 4). The workings are in two groups separated by an unexplored segment of the Butte vein. This segment is 100 to 150 feet long at the surface. One group is in the southeastern part of the Butte claim and is interconnected with workings of the King Solomon mine. The other group is in the northwestern part of the Butte claim and in the Butte Wedge claim.

The southeastern group consists of about 10,400 feet of drifts and crosscuts and four shafts. The shafts are, from southeast to northwest, the Ferris, No. 6, Road, and Midway, are inclined approximately 45° NE., and are from 200 to 400 feet apart. The No. 6 shaft is the deepest, is the only one that connects with all nine levels, and was the only one in operating condition in 1958. The nine levels are at inclined depths of 65, 100, 165, 200, 250, 300, 350, 400, 500 feet as measured down the No. 6 shaft. The Ferris shaft extends to the 250-foot level, and the Midway shaft to about the 200-foot level.

The northwest group of workings consists of 1,600 feet of level workings and three shafts. The workings connect with about 800 feet of drifts and crosscuts on the Butte Wedge claim. The Perpendicular and an unnamed shaft, 240 feet apart, connect to drifts on three levels (121, 140, and 222 feet) and are connected by two drift levels. The No. 7 shaft is 100 feet deep and connects with two levels which aggregate 100 feet of drifts.

A mill, between the No. 6 and Road shafts, is equipped with two five-stamp batteries, each with an amalgamation plate. One battery is modified to treat ores on a gravity table. At least one of the batteries has been operated nearly continuously in recent years as a custom mill for gold and tungsten ores. Since 1956, the Butte mill has been the only stamp mill in southern California in which custom gold ores have been accepted. Ores that can be suitably milled by gravity separation also are accepted at the mill. Water for the mill is supplied from a source below the 500-foot level of the mine.

Cactus Queen (Blue Eagle, Cactus) Mine (includes *Silver Prince property* in the northeast part of the deposit). Location: SW¼NW¼ sec. 17, T. 10 N., R. 13 W., S.B.M., Mojave district, 10 miles northwest of Rosamond, at the southwest base of Middle Butte. Ownership: Mr. Clifford G. Burton, Rosamond, owns 340 acres of patented property. The Silver Prince property, 120 acres, is owned by Mrs. George B. Kimball, 1701½ Glencoe Way, Glendale 8 (1958).

Gold was discovered at the site of the Cactus Queen mine in the fall of 1934, and soon afterward the property was purchased by Clifford Burton, who in turn leased, and later sold, the mine to Cactus Mines Co. From 1935

through 1943 this company vigorously developed the mine and when it was shut down in 1942 by order of the War Production Board more than 230,000 tons of ore had been produced. This output yielded an average of 0.35 ounces of gold and 10 ounces of silver per ton. In addition, 7,500 pounds of copper and 2,500 pounds of lead were recovered during 1941-43. The mine was idle from 1943 to 1947, but from 1948 to 1952 three individual lessees mined 23,000 tons of ore which yielded an average of 0.5 ounces of gold and 0.9 ounces of silver per ton. The mill and shops, which were erected in the late 1930s, were dismantled and sold by auction in 1957 and 1958. The value of the total production from the mine exceeds $5,000,000.

Gold, silver, copper, and lead minerals are in a fissure vein which strikes N. 45° E. and dips 35° SE. The vein is 3 to 20 feet wide and extends 4,000 feet along the western margin of Middle Butte. The vein lies along a major fault which, at the surface, separates Mesozoic quartz monzonite on the northwest from Tertiary quartz latite porphyry on the southeast. Quartz monzonite underlies quartz latite on the southeast or hanging wall side between the 500 and 600 levels of the northeastern part of the vein, and between the 700 and 800 levels in the southwestern parts of the mine (Schmitt, 1940). The principal ore minerals in the vein are proustite, argentite, electrum, and finely divided free gold in a gangue of alunite, kaolinite, quartz, marcasite, pyrite, and arsenopyrite. Locally present are chalcopyrite, galena, sphalerite, tetrahedrite, stromeyerite, pyrargyrite, and covellite. Jarosite, plumbojarosite, and argentojarosite are abundant in parts of the oxidized zone of the vein near the surface (J. Fraser, 1939, unpublished). The presence of alunite associated with quartz in the upper levels of the mine commonly is indicative of the presence of gold.

Mine workings total 12,000 feet of drifts and crosscuts on ten levels at 100-foot vertical intervals; all levels are appended to a 1,000-foot inclined shaft (pl. 5). Three hundred fifty feet south of this shaft, a winze was sunk from the 300 level to the 1000 level. A second shaft several hundred feet northeast of the main shaft, and on the Silver Prince property, was sunk to the 600 level on the vein with six levels at approximately 100-foot intervals. Another inclined shaft northeast of the Silver Prince also extends to the 600 level.

Consolidated Mine (includes *Good Hope* and *Kenyon Mines*). Location: SE¼ sec. 35, T. 29 S., R. 40 E., M.D.M., east end of town of Randsburg, on south side of the main street through Randsburg. Ownership: Consolidated Mines Co., address undetermined in 1958. Office was at 1402 S. Wilton Place, Los Angeles, in 1949. The company owned the Good Hope, Standard, Four Hundred, Amended Galveston, and Twin Brother patented lode claims in 1949.

The total output of gold from the mine was not determined, but is estimated by the writers to be valued at more than $50,000. Most of the ore was mined during the intervals 1897-1901, 1913-17, and 1934-40. It averaged about 0.25 ounces of gold per ton. An undetermined, but probably small, quantity of scheelite ore was also mined. About 1955, a five-stamp gold mill on the property was modified to handle scheelite ore from the Billie Burke mine a few tens of feet south of the mill. The Consolidated mine has been idle since about 1940.

The two principal veins at the Consolidated mine, the Butte and Good Hope, occupy faults about 1,000 feet apart in Rand schist. Both veins are composed of brecciated, iron-stained, and silicified schist which contains fine, free gold and, locally, scheelite. The Butte vein is on the north side of Fiddlers Gulch at the north end of the property and extends several hundred feet southeast and northwest into the Little Butte and Butte mines, where it has been mined also. The vein strikes N. 70° W. and dips 45° NE. It is along the footwall of a diorite dike which extends about a mile to the southeast and a mile to the northwest of the Consolidated mine property.

The Good Hope vein is south of the Butte vein and 200 or 300 feet south of the main street through Randsburg (fig. 45). The northwestern part of the Good Hope vein strikes N. 40° W. and dips 50° NE, but the southeasternmost part of the vein, about 300 feet farther southeast, strikes north and dips 40° E. The trace of the vein is arcuate and open to the southwest. A shorter vein which strikes N. 40° W. joins the southeastern part of the Good Hope vein from the northwest.

The extent and location of the lower ore shoots on the veins were not determined by the writers, but most of the veins have been stoped to the surface from at least the upper levels along most parts of the veins. One of the ore shoots was reported to be about 300 feet long and an average of 20 inches wide (Brown, 1916, p. 496). The ore shoots on the Butte vein are probably similar to those in the Butte mine, which is described above. Gold-bearing diorite and rhyolite dikes which formed parts of the walls at the junction of the N. 40° W.-trending vein and the Good Hope vein were mined also.

The workings of the Consolidated mine consist of a 500-foot main inclined shaft on each of the two principal veins. Drift levels extend at approximately 50-foot intervals from both shafts and aggregate several thousand feet in length. The upper levels connect with several shorter shafts to the surface. Most of the stopes were developed in the upper levels and averaged from 2 to 4 feet in width.

Elephant (Elephant-Eagle, Lodestar) Group (includes *Excelsior Mine*). Location: mostly in the NW¼ sec. 6, T. 10 N., R. 12 W., S.B.M., Mojave district, 5 miles southwest of Mojave on a northwest-trending ridge at the northwestern tip of Soledad Mountain. Ownership: Goodwin J. Knight, 344 S. Las Palmas, Los Angeles (1958). The Elephant group comprises twelve unpatented claims originally known as the Elephant group and later as the Elephant-Eagle mine (1934), the Lodestar mine (1935-41), and since 1941 again as the Elephant group.

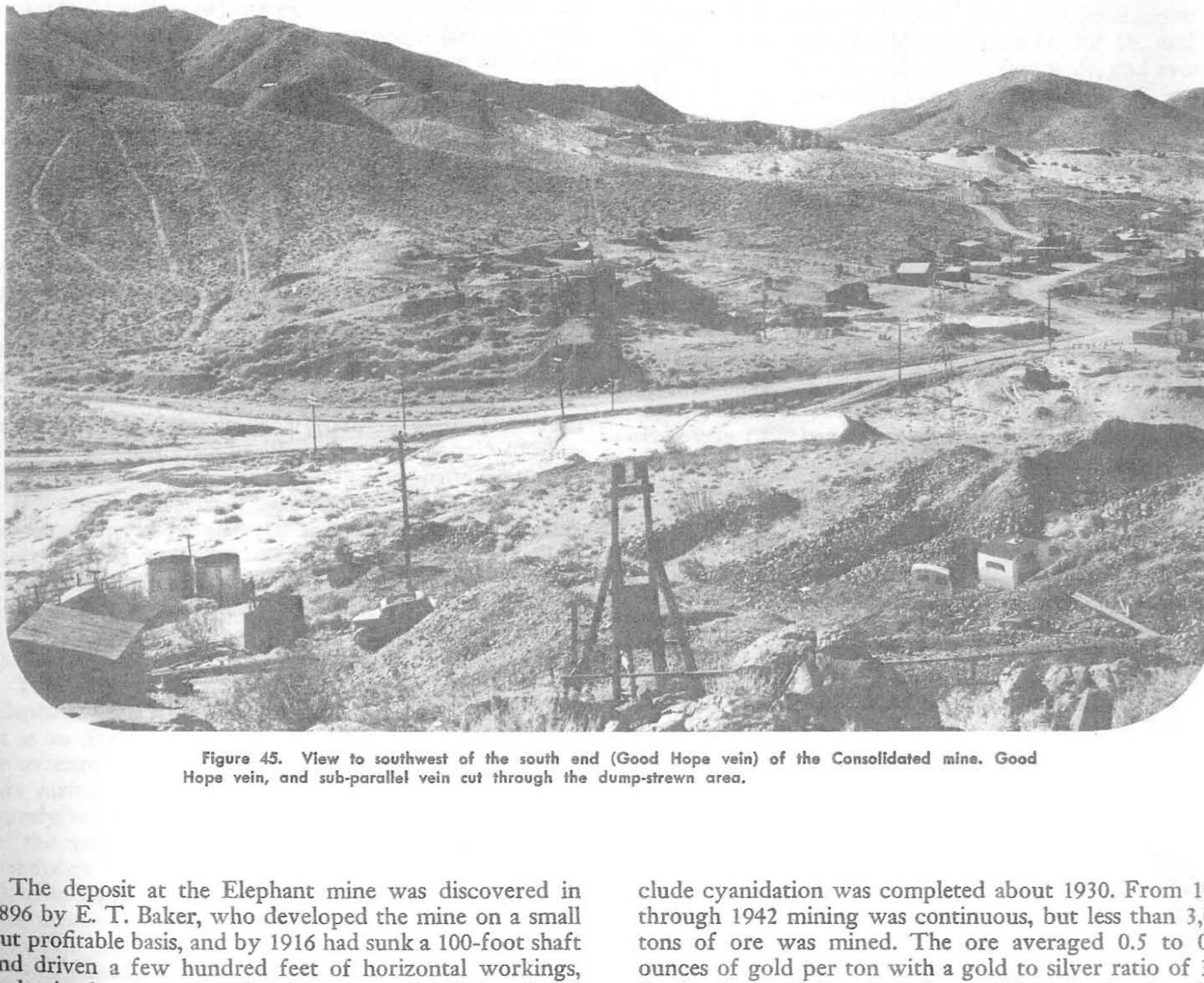


Figure 45. View to southwest of the south end (Good Hope vein) of the Consolidated mine. Good Hope vein, and sub-parallel vein cut through the dump-strewn area.

The deposit at the Elephant mine was discovered in 1896 by E. T. Baker, who developed the mine on a small but profitable basis, and by 1916 had sunk a 100-foot shaft and driven a few hundred feet of horizontal workings, and mined a stope 120 feet long on the 100-foot level. Ore mined during this period averaged 0.75 to 3.5 ounces of gold per ton; an exceptionally rich part of the vein, known as the "hot spot," yielded a 3½-ton lot of ore which contained gold valued at $7,000, and an additional 70 tons that averaged $1,000 per ton in gold (Julihn and Horton, 1937, p. 21). After 1918 the ownership of the mine changed several times, and mining was done mostly by lessees. Ore mined from 1896 through 1920 was shipped to American Smelting and Refining Co., Selby, California. About 1920, a 25-ton ball mill and amalgamation plates were installed. Conversion of the mill to include cyanidation was completed about 1930. From 1931 through 1942 mining was continuous, but less than 3,000 tons of ore was mined. The ore averaged 0.5 to 0.75 ounces of gold per ton with a gold to silver ratio of 3:4. During the period 1948-50 lessees shipped a few hundred tons containing 0.7 ounces of gold per ton. No underground mining has been done since 1950, although in 1958 two lessees attempted to rework one of the mine dumps without success. Total production is reported to be about $250,000 (Nelson, 1940).

The deposit consists of three sub-parallel quartz veins from 200 to 400 feet apart in rhyolitic volcanic rocks. The veins strike N. 10° to 25° W. and dip from 80° NE to 70° SW. They are composed of brecciated quartz recemented with quartz and contain oxidized pyrite, fine free gold, and cerargyrite. Argentite was noted in the

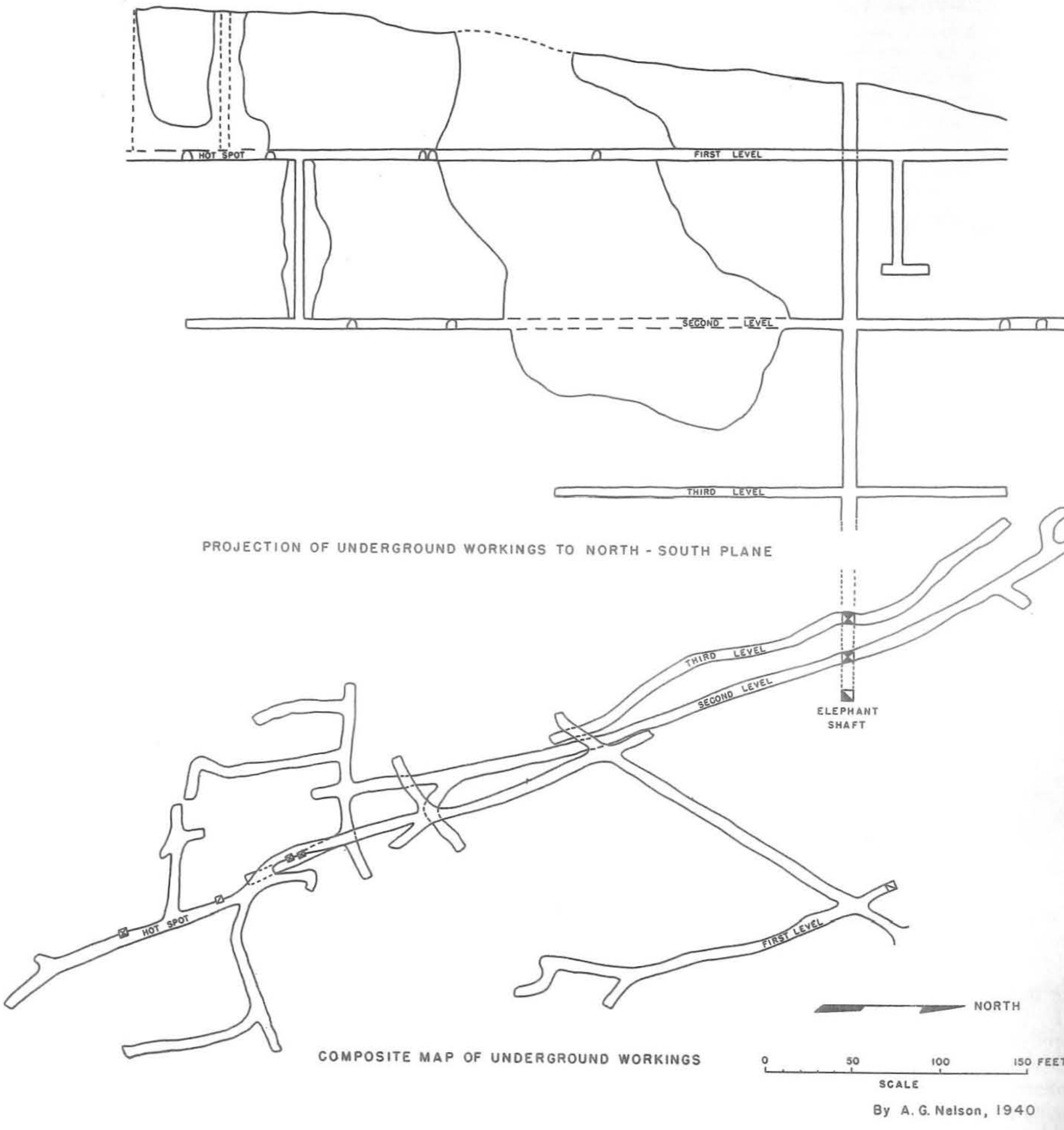


Figure 46. Composite plan and vertical projection of the Elephant mine.

lower parts of the vein (Tucker and Sampson, 1935, p. 473) and proustite, though rare, has also been reported (Nelson, 1940). From northeast to southwest the veins are designated as the Hope, Elephant, and Excelsior.

The Hope vein crops out on the southwest side of a northwest-trending ridge, and crosses the ridge just south of a small knob. The vein strikes N. 15° W. dips steeply southwest and is from 1 to 3 feet wide. It is traceable along strike for about 1,500 feet. The vein is developed by a 400-foot drift adit driven northwestward from the southwestern base of the ridge. A stope 3 feet wide was excavated starting from a point 160 feet from the portal, extending 100 feet along the strike, and mined 50 to 100 feet to the surface. The vein was stoped underhand below the level to an estimated 50-foot depth. A shorter drift adit was driven northwest from a point above and a few tens of feet northwest of the stope.

The Elephant vein crops out 400 feet southwest of the Hope vein on the southwest side of the ridge; it strikes N. 22° W. and dips 70° SW. The hanging wall is silicified flow-banded rhyolite and the footwall is quartz latite porphyry. The vein ranges in width from 7 feet near the surface to 2 feet in some of the lower workings, and extends a strike distance of 600 feet (fig. 46). Workings consist of a 500-foot inclined shaft with one level at 50 feet and a few levels at 100-foot vertical intervals below that point. The levels aggregate at least 2,300 feet of horizontal development. Two 50-foot shafts were sunk a few hundred feet southeast of the inclined shaft. The principal ore body was 150 feet southeast of the main shaft and has been stoped to a depth of 50 feet below the 150 level along a strike distance of 120 feet. It averaged 3 feet wide and raked about 70° NW. Smaller stopes, including the "hot spot", are appended to the two shallower shafts.

The Excelsior vein, which is 200 feet southwest of the Elephant vein, strikes N. 10°-15° W. and dips 80° NE. It is in fine-grained flow-banded rhyolite. It is 2 feet in average width and can be traced about 1,000 feet on the surface. The southeast half of this vein crops out mostly on the west side of Soledad Mountain southeast of the main part of the Elephant group workings. The northwest half, known as the Bobtail vein (see *Bobtail mine* in text), crops out low on the southwest flank of the main ridge. The southeast half is developed by a 400-foot drift adit *(Excelsior mine)* which intersects a 150-foot shaft, 100 feet from the portal. Ore was stoped to the surface from the bottom of the shaft along a strike distance of 100 feet.

Gold Bug Mine. Location: NE¼NW¼ sec. 34, T. 27 S., R. 40 E., M.D.M., Rademacher district, 5 miles south of Ridgecrest. Ownership: Anthony De Mayo, P.O. Box 14, Ridgecrest, owns three claims; lives on property (1957).

The Gold Bug mine, one of the oldest mines in the Rademacher district, was active between the 1890s and 1901, and intermittently during the intervals 1908-12, 1927-31, 1934-42, and 1949. It has been owned by De Mayo since 1928. According to production records, the average grade of ore mined since 1901 has been less than half an ounce of gold per ton. The total value of gold produced from the mine is undetermined. The mine also has yielded silver, and a small amount of copper.

Free gold is associated with iron-stained quartz veins occupying three faults. These are approximately 75 feet and 100 feet apart in Mesozoic granitic rocks. The veins are named, from northeast to southwest, the Gold Bug, Mountain Lion, and One Man. The most productive vein has been the Gold Bug which strikes N. 30° W. and dips 70° NE. It is from 18 inches to 8 feet wide, and averages about 2½ feet in width. The principal ore shoots, a maximum of 60 feet long, about 50 feet in depth, and 8 feet thick, are at an intersection of the vein with a diorite dike (Tucker and Sampson, 1933, p. 303). A few tens of feet south of the shaft on the Gold Bug vein, the vein is cut by a north-trending, vertical fault. North of the shaft the vein is cut by a vertical fault which strikes N. 65° W. The Gold Bug vein has been explored to a depth of 300 feet and barely more than 200 feet laterally underground. It crops out for about 500 feet.

The Mountain Lion vein, which strikes N. 40° W. and dips 45° NE., is in a fault zone along the footwall of a diorite dike. It may be a faulted segment of the Gold Bug vein (Tucker and Sampson, 1933, p. 304). The vein contained ore 2½ feet wide at a depth of 60 feet (Tucker and Sampson, 1933, p. 304).

The One Man vein which strikes N. 20° W. and dips 70° NE., has been explored less than the other veins.

The Gold Bug mine workings consist of a 300-foot shaft inclined 70° NE. on the Gold Bug vein, a 60-foot shaft inclined 45° NE. on the Mountain Lion vein, and a 105-foot shaft inclined 70° NE. on the One Man vein. The Mountain Lion shaft is 150 feet west of the Gold Bug shaft; the One Man shaft is 275 feet southwest of the Gold Bug shaft. Apparently only the Gold Bug shaft contains lateral workings. These are levels at 20, 40, 100, 150, 200, and 300 feet, which total about 750 feet in length. The longest drifts northwest are the 100 level of 150 feet and the 200 level of 100 feet. The drifts southeast of the shaft are from 20 to 80 feet long. All but the 300 level are connected by stopes and raises. Stopes were driven southeast of the shaft between the 200 and 150 levels and on the 40 level. A small stope lies northwest of the shaft on the 100 level.

Golden Queen Mine * (includes *Silver Queen, Queen Esther, Echo, Gray Eagle, Soledad Extension Properties*). Location: Most of the north- and south-central parts of sec. 6, T. 10 N., R. 12 W., S.B.M., Mojave district, 5 miles southwest of Mojave on the north slope of Soledad Mountain. Ownership: the largest assemblage of claims, known as the Golden Queen and Echo groups, is owned by Le Roy O. Schultz, M.D., 527 Kenneth Rd., Glendale, and comprises approximately 200 acres in contiguous

* Compiled in large part from descriptions by Julihn and Horton (1937) and from unpublished maps by J. B. Stone (1937).

south from the portal at the mill site then 1,500 feet S. 30° E., parallel to, but in the footwall of, the Silver Queen vein. It was driven 1,450 feet farther S. 25° W. crosscutting the workings on the Golden Queen, Starlight, and Soledad Extension veins. At a point 950 feet southeast from the portal a crosscut was driven 80 feet northeastward to the Silver Queen vein where a 600-foot drift was extended southeastward to an 800-foot inclined supply shaft. A second major shaft, known as No. 2 ore pass, is 600 feet southeast of the supply shaft and extends to the 600 level.

Starlight and Golden Queen Veins. The Starlight vein, which crops out about 400 feet southwest of the Silver Queen vein, strikes N. 30° W. and dips 70° SW. It is from 3 to 30 feet wide and is exposed 3,000 feet along strike and 800 feet down dip. The vein is similar in composition to the Silver Queen vein. Country rock is predominantly fine-grained rhyolite and rhyolite breccia, although quartz latite porphyry forms the footwall in a large part of the northwestern sections of the vein. A post-ore fault (Main fault), that strikes nearly parallel to the vein and dips 50° NE, intersects the vein about 25 feet above the No. 1 or 100 level, and displaces the upper part of the vein 100 feet down the dip of the fault (fig. 47). This offset has repeated the vein 200 feet to the northeast at points above the 200 level. This repeated or displaced segment, known as the Golden Queen vein, strikes N. 35° W. and dips 70° SE. Fine-grained rhyolite forms both walls in most areas, although rhyolite breccia is found locally. The width of the vein ranges from 10 to 50 feet, but mined portions averaged 30 feet; the vein has been explored for 2,000 feet along the strike. The lower limit of the vein is between the 200 and 300 levels at an elevation of 3,500 feet.

A nearly continuous ore body on the Starlight vein was mined from the 300 level to the 100 level along an 850-foot length southeastward from a point 75 feet south of the portal of No. 1 level. A similar ore body, which is probably the offset portion of the main Starlight ore body, was mined on the Golden Queen vein from the 200 level to the O level along a strike length of 850 feet southeastward from a point 230 feet southwest of the corresponding position on the Starlight vein ore body. If the two ore bodies were a continuous ore shoot before faulting, an oblique right-lateral normal movement is indicated along the Main fault.

The Starlight and Golden Queen veins were developed by 27,500 feet of horizontal workings on nine mine levels accessible through five drift adits on the 0, 100 (No. 1), 200, 400, and 600 levels (pl. 6). The four lower levels, designated 700, 800, 900, and 1,000 levels, were serviced by No. 314 winze which was collared on the 300 level and is 500 feet northwest of the main crosscut haulage way on the 600 level. No. 314 winze was sunk to explore the lower sections of the vein, and it extends 450 feet on the incline below the 600 level to an elevation of 2,770 feet. Levels on the 800, 900, and 1,000 levels were only slightly developed.

Gray Eagle and Gypsy Veins. The Gray Eagle and Gypsy veins, two nearly parallel veins less than 40 feet apart, crop out northeast of the Echo vein, strike N. 20° W., dip steeply northeast, and are from 1 to 6 feet wide. They can be traced from their most northerly outcrops near the portal of the 400 level on the Starlight vein, also known as Gray Eagle adit, southeastward to their junctions with the Starlight vein about 400 feet southeast from the portal. These junctions are at the north end of the ore shoot on the Starlight vein, and may have been a contributing factor to the locus of mineralization there. The intersection of the three pre-ore faults probably resulted in more severe fracturing of the rock than in other parts of the vein and thereby offered a better channelway for mineralizing solutions.

The principal ore shoot on the Gray Eagle vein was mined from a 2,300-foot adit driven a few hundred feet eastward to crosscut the Gypsy and Gray Eagle veins and then southeastward along the Gray Eagle vein to its junction with the Starlight vein (pl. 6). The ore shoot was 4 to 6 feet wide, extended 250 feet along the strike, and was mined 150 feet upwards to the surface (Julihn and Horton, 1937, p. 21).

Soledad Extension Vein. The discovery site of the Soledad Extension vein is near the center of the southern boundary of section 6 (fig. 17) at the head of a broad alluviated canyon just south of a pronounced ridge that trends N. 45° W. There, the vein strikes N. 45° W. and dips 70° SW. Flow-banded rhyolite forms the footwall and rhyolite breccia the hanging wall. The vein is from 5 to 30 feet wide and extends 1,200 to 1,400 feet southeast to a junction with the Starlight vein. The vein material is typical of that of the whole group as described for the Silver Queen vein above.

Development on the Soledad Extension vein consists, essentially, of 10,000 feet of horizontal workings on eight mine levels which are spaced at about 100-foot vertical intervals, a 600-foot winze under the upper ore shoot, and a 450-foot winze near the face of the 3,000-foot drift adit driven on the Starlight vein on the 400-foot level (pl. 6). This 450-foot winze approximately coincides with the intersection of the Starlight and Soledad Extension veins.

Two distinct ore shoots have been mined. One was mined from the 400 level adit. It extended 350 feet along strike from a point 400 feet from the portal. The ore body, which was mined to a maximum height of 150 feet above the drift and only 25 feet below, averaged 0.4 ounces of gold and 2 to 3 ounces of silver per ton (Julihn and Horton, 1937, p. 23). A second ore body on the 600 level was mined 500 feet along strike from a point 600 feet southeast of the 600-foot winze from the 400 level. This ore shoot was mined to within 50 feet of an intersection of the vein with the Starlight vein. Ore was mined up to a sub-level 100 feet above the drift, but no mining was done below the drift. The intersection also has been prospected on the 400, 700, and 800 levels but no ore was developed.

Echo Vein. The Echo vein lies between the Soledad Extension and Starlight veins, but is farther northwest and may be an extension of the Starlight vein. It strikes N. 40° W., dips 70°-80° SW. In the main workings it has a fine-grained rhyolite hanging wall, and a quartz latite porphyry footwall. Although the vein is only 1 to 6 feet wide it has been exposed for more than 1,100 feet along the strike.

Development consists principally of a 230-foot crosscut adit driven S. 27° W. to the vein and a 1,100-foot drift southeastward. Ore has been stoped a few tens of feet above the initial 600 feet of drift and a 100-foot winze was sunk at a point 560 feet from the portal. Two hundred sixty feet beyond the winze, a 500-foot crosscut was driven northeastward toward the Gray Eagle vein, but did not intersect it.

*Gwynne (Gwynne-Jennette, Jeannette, Jennette) Mine.** Location: E.½ sec. 21 and W.½ sec. 22, T. 29 S., R. 34 E., M.D.M., in the Piute Mountains area, 3 miles south of Claraville. Ownership: J. C. Geringer estate (Bank of America, Bakersfield, trustee), owns six claims in the Gwynne group, including the Chief, Dead Tree (pat.), Hard Luck, Jennette, Jennette Annex, and Shasta claims (1958).

The Gwynne deposit is a series of gold-and tungsten-bearing quartz veins in granitic country rock. It has been explored and mined by means of nearly 2 miles of underground workings. The mine has a recorded output of $770,000 in gold (Tucker 1949, p. 224). The property was known for much of its life as two separate mines, the Jennette and the Gwynne. In 1916 the Jennette was reported to be the principal source of gold in the Green Mountain district (Brown 1916, p. 498); at this time the less significant Gwynne workings were known as the Kern County Consolidated Mines. By 1933 the properties had been consolidated, and mining was confined to the Gwynne workings. The total yield to that date was reported to be $500,000 (Tucker and Sampson, 1933, p. 309). After the mining of gold ceased in 1942, an undetermined but small tonnage of scheelite was mined from the Gwynne vein, where the mineral was found in irregular masses, and from the Kersey vein, where it was in a thin discontinuous seam along the hanging wall. In 1942 the mine was shut down and it has been inactive since. Caving near the portals made the mine inaccessible when visited in 1955.

The three principal quartz veins, the Gwynne, Jennette, and Kersey veins (fig. 48), cut Mesozoic granitic rock. The most productive vein has been the Gwynne vein, which ranges from 6 inches to 5 feet in width, and has an average width of about 1 foot. The Gwynne vein strikes E. to N. 70° E. and dips 40° S. South of the Gwynne vein and converging with it to the northeast is the Kersey vein, which is as much as 9 feet wide, with an average width of about 3½ feet. The Kersey vein strikes northeast and dips about 50° southeast. The Jennette vein is exposed about half a mile to the northeast of the main exposures of the other two veins which it intersects at the northeast end of the property. The Jennette vein is as much as 2 feet wide, but averages 6 inches in width. It strikes N. 80° E. and dips 40° S. Several smaller veins in the mine area strike northeast and dip southeast, but their surface exposures are obscure in the weathered country rock, and they have been but little explored. Many quartz veins and stringers are in the fractured zones near the vein intersections.

Free gold, with pyrite, marcasite, arsenopyrite, and some scheelite, is in the vein quartz. The gold is mostly free milling. Milled ore from the Gwynne and Jennette veins is reported to have had an average value of $40 to $50 per ton; ore from the Kersey vein was reported to average $20 per ton.

Most of the mine workings are on the southwest part of the property and lie on the Gwynne and Kersey veins (fig. 48). The Gwynne vein was followed by a lower adit driven 2,600 feet northeast. At 1,600 feet from its portal is a raise to the surface, and 400 feet farther is a 300-foot raise. This adit also gave access to several hundred feet of drifts, winzes, and stopes on the Kersey vein. About 900 feet east and 100 feet higher than the portal of the main adit is the portal of the upper Gwynne adit, which extends about 900 feet to the east. Near its underground extremity this adit also connects with workings on the Kersey vein. The Gwynne vein was also explored by means of a 300-foot inclined shaft 270 feet northeast of the portal of the lower adit, from which two levels of unreported depth and extent were driven on the vein. The Kersey vein was developed by means of a drift adit driven about 600 feet northeast, with an 85-foot winze sunk about 300 feet from the portal, and several hundred feet of drifts and stopes on the vein from the winze. An ore shoot in the Kersey vein was reported to be 300 feet long, and 4 feet in average width.

The Jennette vein was intersected by a crosscut adit driven 150 feet southward to the vein, from which place a 700-foot drift was driven west along the vein. Two ore shoots, each 300 feet long and averaging 6 inches in width, were stoped above this drift. The crosscut adit was continued for about 450 feet past the vein in an effort to intersect the Gwynne and Kersey veins, but was abandoned about 200 feet short of this goal. An upper drift adit, with the portal about 200 feet west of the lower adit portal and about 100 feet vertically above it, is driven west about 400 feet and stoped for most of this distance to the surface.

High Grade (includes *Pennsylvania, Early Sunrise* or *Sunrise, Ana Isabell) Mine.* Location: SW¼ sec. 35, T. 26 S., R. 32 E., M.D.M., Keysville district, a quarter of a mile south of old Keysville townsite and a quarter of a mile northeast of the Mammoth mill. Ownership: W. H. Whitnall, 6315A Benson St., Huntington Park, and Mr. Schoneman, address not determined (1957).

The High Grade mine comprises four claims which, prior to 1900, were worked as three mines—the Pennsylvania, (Early) Sunrise, and Ana Isabell. These mines were

* By Thomas E. Gay, Jr.

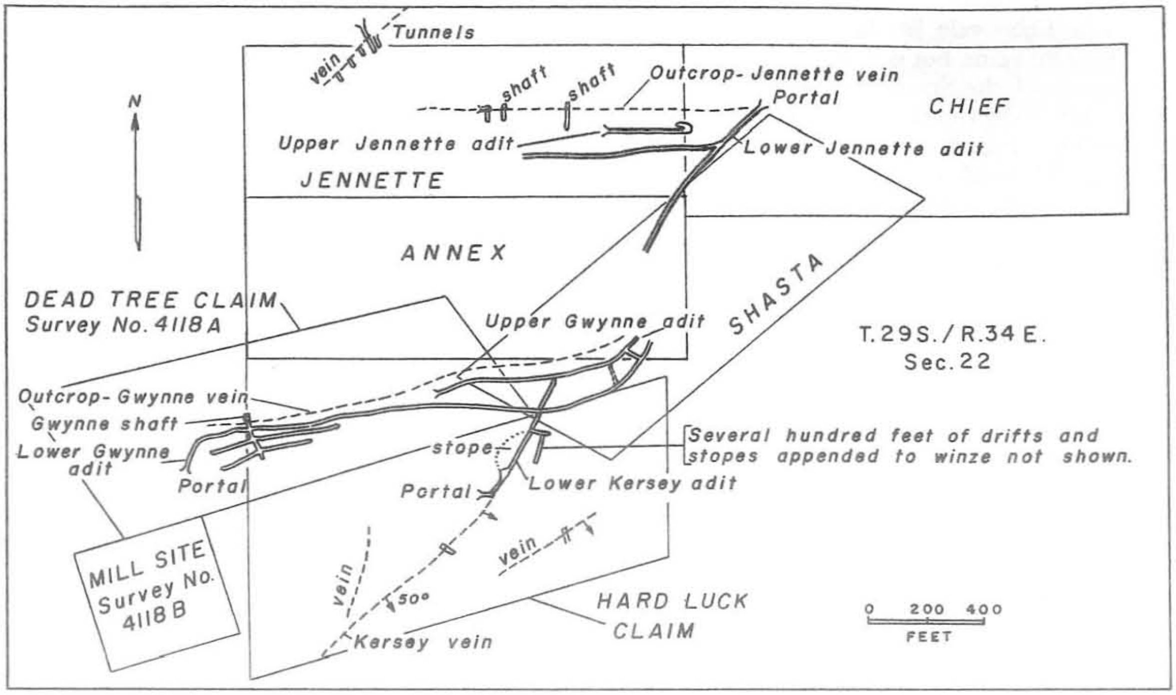


Figure 48. Claims, veins, and underground workings of the Gwynne mine.

consolidated under the name of the Pennsylvania mine in the early 1900s. Most of the ore was probably mined prior to 1890 before production figures were officially recorded. The principal periods of activity were 1853-60 (?), 1900-04, 1921-23 and 1940-42. More than 500 tons of ore have been mined since 1900, the average grade of which was 1½ ounces of gold per ton. The mine was idle early in 1959.

The deposit consists of two poorly exposed gold-bearing quartz veins, about 300 feet apart in biotite quartz diorite. The veins strike about N. 40° E. and dip 70° SE.; they range in width from 2 to 6 feet and are exposed laterally at least 800 feet. They are composed largely of quartz and fault gouge which contain very sparsely scattered small grains of arsenopyrite and pyrrhotite.

The Pennsylvania vein, the most northwesterly of the two, is developed by a 210-foot inclined shaft to which 50-, 100-, and 200-foot levels are appended. The maximum lateral extent of these workings is about 400 feet. Most of the stoping was done above the 100 level, but the total extent was not determined because the workings are badly caved. Access to part of the workings can be gained through a 900-foot crosscut adit driven northwest and intersecting a drift of the 200 level at a point 300 feet northeast of the shaft. In 1958, water for use on a nearby ranch was being obtained from a winze in the crosscut adit.

Southwest of the portal of the crosscut adit and 80 feet above in elevation is an 800-foot drift adit driven S. 40° W. on the Sunrise vein. Total extent of these workings was also not determined because the adit is caved.

Joe Walker Mine. Location: E½ sec. 12, T. 29 S., R. 32 E., M.D.M., on the northeast edge of Walker Basin, 7 miles southeast of Havilah. Ownership: Vern Shell, address undetermined, owns two patented claims (1958).

The deposit on this property was discovered in 1865 by Joe Walker and was operated continuously from 1865 until 1874. The ore was milled on the property in a 20-stamp mill. The mine was shut down in 1874 because it was too costly to keep the lower workings free of water. The mine has been idle since then except for a few intermittent and short periods, the most productive and recent of which was in 1951. At that time the Basin Mining Co., Dan Cronin, P.O. Box 726, Bakersfield, president, recovered more than 900 ounces of gold from an undisclosed tonnage of ore.

Mesozoic quartz diorite underlies the entire mine area. The gold is in a quartz vein 4 to 20 feet wide, which strikes N. 45° E. and dips 60° SE. The ore consisted mostly of quartz containing auriferous pyrite and arsenopyrite and traces of chalcopyrite. According to Goodyear (1888, pp. 317-318) the mill heads contained an average of 1.2 ounces of gold per ton and the gold-silver recovered was valued at $500,000 to $600,000.

The mine was developed by a 250-foot inclined shaft (No. 1) and a 350-foot inclined shaft (No. 2) 260 feet to the southwest. On the 250-foot level, drifts were driven 30 feet southwest of No. 2 shaft, 260 feet northeast to No. 1 shaft and 320 feet beyond the shaft. Goodyear (1888, p. 317) reported that ore was stoped to the surface from all of the 630 feet of drifts on the 250 level,

but an unpublished report by R. J. Sampson (1949) indicated that ore was stoped for a distance of 210 feet southwest of No. 1 shaft and an undetermined distance to the northeast. The 350 level was originally driven about 100 feet southwest from No. 2 shaft and about 320 feet to the northeast. During 1958, water from the mine was being used to irrigate nearby land in part of Walker Basin.

King Solomon (Ashford) Mine. Location: NE½-SW¼ sec. 36, T. 29 S., R. 40 E., M.D.M., Rand district, half a mile east of Randsburg, half a mile southwest of Johannesburg, on north slope of east end of Rand Mountains. Ownership: Shipsey Mining Co., Alban Walton, president, 600 Mound Avenue, South Pasadena, owns five claims; mine and mill are leased to Glenn Trammill and others, Johannesburg (1958).

The veins at the King Solomon mine were discovered in 1895 or early in 1896 by the Ashford brothers of Randsburg. They organized the Ashford Mining Co. and operated the mine until about 1914 when the mine was sold to the Shipsey Mining Co. Between 1914 and the late 1940s the mine was operated nearly continuously by the owners and under lease to mining companies and individual lessees. Some of the companies that operated the mine during this time interval were the King Solomon Consolidated Mines Co. (1920s and 1930s), San Francisco Mining Co. (1925-26), Mount Gaines Mining Co., Inc. (a subsidiary of International Mining and Milling Co.) (1937-?), and King Solomon Mines lease (early in 1940s). Individuals and groups of lessees have mined the property at intermittent intervals since about 1940.

More than $500,000 in gold, with an average fineness of about 780, has been recovered. Nearly 75 percent of the gold was obtained between 1919 and 1942. The ore mined was valued at about $25 (Hulin, 1925, p. 136) per ton.

Rand schist is the most common wall rock in the King Solomon mine, although quartz monzonite joins one or both walls of veins in the southern part of the mine. The veins are composed of brecciated, iron-stained, and silicified host rock with occasional stringers of quartz. Silification and iron-staining of the wall rocks is common. In general, the richest parts of each vein are immediately below a shear at the hanging wall. Gold is present as tiny grains and flakes; more rarely as very thin seams. Throughout the mine, the mined portion of the veins probably averaged $20 or less in gold and was about a foot in average width. Iron stains in and adjacent to the veins are probably derived from oxidized iron sulfides.

About twelve veins are known on the surface or in the workings of the King Solomon mine (pl. 7) but four of them—from south to north, the Magpie, Back, Nosser, and King Solomon—have been the source of most of the gold ore. Veins of lesser production or none at all include the Checoses, Parker, and Shipsey; others have not been named. The veins are in two systems which merge or intersect in the western part of the mine property and extend northwest into the adjoining Butte mine. The most productive system strikes from N. 80° to N. 60° W. and dips 40°-50° SW to NE. It contains most of the veins listed above. The other system strikes about N. 35° W., and dips 40°-50° NE. It has yielded little ore except at junctions with veins of the other system. In general, the veins of both systems are several tens of feet apart and are characterized by a strongly slickensided hanging wall and a poorly- to well-defined footwall.

As determined from the distribution of stopes shown on the map of the underground workings of the King Solomon mine (pl. 7), the principal ore shoots were on the Back, Magpie, and Nosser veins. Stopes were developed near the junction of the Back and Magpie veins above the 300 level in the southwestern part of the mine. Ore shoots in the Nosser vein were mined between the 300 and 550 levels in the eastern part of the mine and between the surface and the 300 level in the western part of the mine. The Nosser vein was also mined near the surface farther west on Butte mine property where it is known as the "Miller" vein.

The workings of the King Solomon mine consist of about 11,000 feet of horizontal levels at 200, 300, 350, 450, and 550 feet extending from a 580-foot shaft inclined 45° N. 40° E. Three other shafts that connect with the mine workings are inclined northwest to northeast at the west end of the mine property about 700 feet west of the collar of the main shaft. They are, from west to east, the Shipsey, Old Miller, and New Miller shafts, all on the Miller vein. The Shipsey and Old Miller shafts connect with the 300 level of the main shaft and the New Miller shaft connects with the 150 level which contains about 500 feet of crosscuts and drifts. About half of the mine workings are on the 300 level. This level connects with the Butte mine in the southwest part of the mine and at the Shipsey shaft. The 550 level contains the longest crosscut—more than 600 feet in length, extended S. 50° W.

King Solomon (Pleasant View) Mine. Location: NW¼ sec. 18, T. 28 S., R. 33 E., M.D.M., Clear Creek district, 3 miles east of Havilah on the south flank of King Solomon Ridge above Height Canyon. Ownership: G. L. Stubblefield and E. A. Rosa, Havilah (1958).

The King Solomon mine was one of the major mines in the Clear Creek district in the early 1900s. During the period 1912-16 a total of $40,000 in gold was recovered, but the mine has been worked only intermittently since then and has been idle since 1934. A particularly productive year was 1933, when $10,000 worth of gold was extracted from ore that averaged $100 per ton (Tucker and Sampson, 1933, p. 313). The property is easily reached by a dirt road which joins the Bodfish-Caliente Road at Havilah.

The mine area is underlain entirely by Mesozoic biotite quartz diorite. Free gold is in a quartz vein that strikes N. 70° E. and dips 65° southeastward. The vein is 3 feet in average width and can be traced for a distance of 2,000 feet along strike. As in most gold-bearing

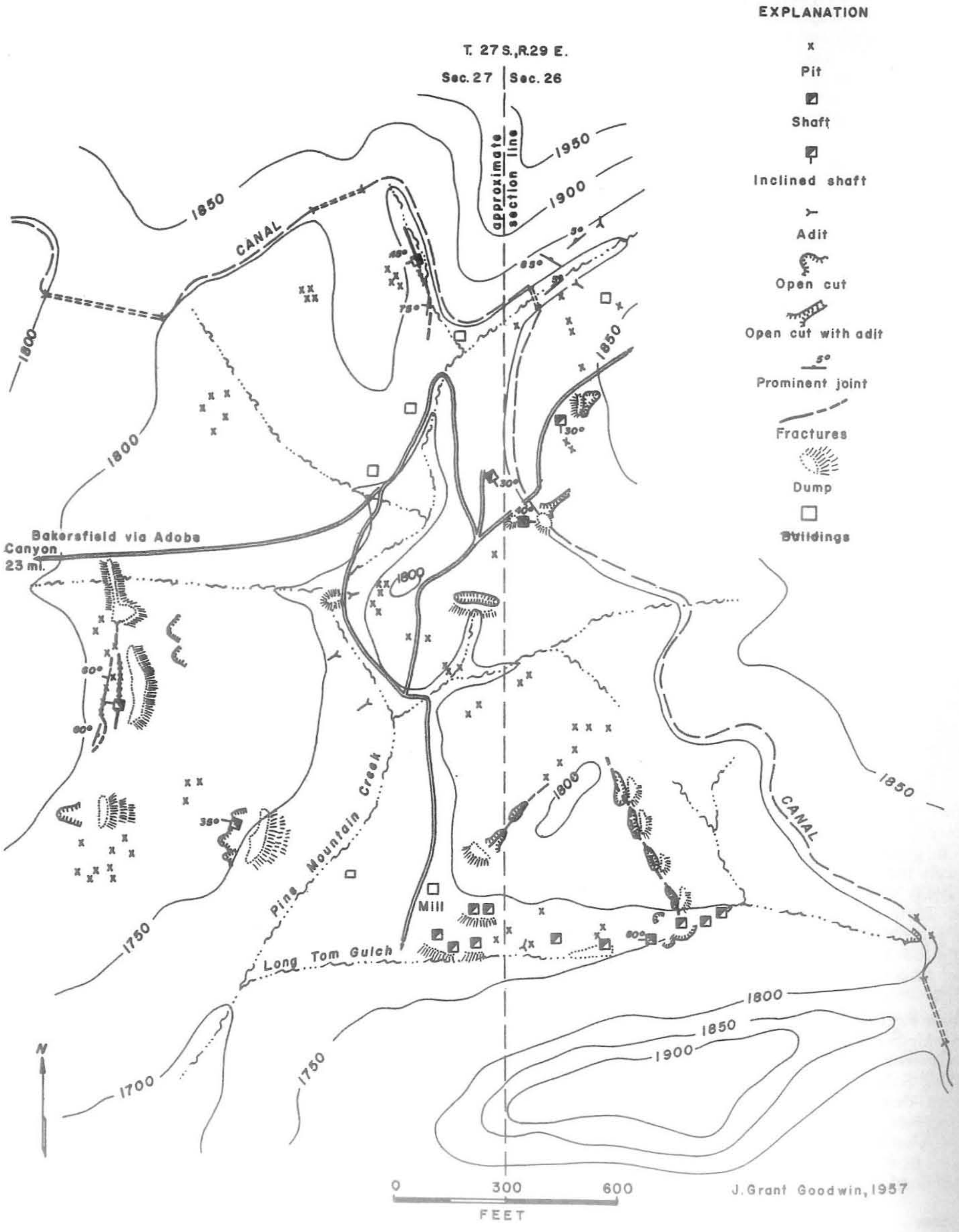


Figure 49. Geologic sketch of the Long Tom mine.

quartz veins in the district, the most common gangue minerals are arsenopyrite and pyrite. Most of the ore mined was from an ore shoot extending 300 feet along strike, and from the 300 level to the surface.

The mine workings, which are now largely caved, consist of a 2,800-foot drift adit connected to a 300-foot vertical shaft. Two other levels append the shaft but their extent or position were not determined. Presumably they were driven from the 100- and 200-foot levels of the shaft. A 50-foot and a 70-foot shaft were sunk on the vein a short distance northeast of where the stope broke the surface, and minor stoping was done (Tucker and Sampson, 1933, p. 313).

*Long Tom Mine.** Location: W½ sec. 26 and E½ sec. 27, T. 27 S., R. 29 E., M.D.M., 10½ miles south of Woody, 3⅔ miles west-southwest of Pine Mountain. Ownership: F. C. Record, Granite Station, has the surface rights; claims are owned by Elise Elledge, 407 2nd Avenue, Louiston, Idaho (one claim), Stella Y. Webb and Illma E. Hawark, 210 Oakview Avenue, Oakview (one claim), and Hattie Yokum, Granite Station (one patented claim), in 1957.

The Long Tom veins were discovered prior to 1860 by prospectors who traced the source of placer gold in Pine Mountain Creek. Ore was originally milled in an arrastre and later in a 10-stamp mill which was enlarged to 20 stamps prior to 1888. The value of ore produced prior to 1889 was not recorded, but it has been estimated to be \$600,000 to \$800,000 (Goodyear, 1888, p. 319). United States Bureau of Mines statistics show that since 1889 the mine has yielded 6,000 tons of ore containing 1,300 ounces of gold. Production has been recorded in 1889, 1896, 1926-35, and 1939. Frank B. Webb, Bakersfield, was the last operator.

The only rock exposed in the area is medium-grained Mesozoic hornblende quartz diorite with local concentrations of gabbroic inclusions. The quartz diorite is highly fractured and deeply weathered. Small auriferous quartz stringers are present along fracture zones (fig. 49), some of which are parallel to prominent jointing in the quartz diorite. One prominent fracture zone on the west side of Pine Mountain Creek strikes north and dips 52° W. West of this zone a second fracture strikes N. 20° E. and dips 60° NW. and converges with the first fracture. The intersection of these fractures plunges about 45° SW.; it has been mined extensively underground. The fracture zones are composed of ramifying veinlets of milky quartz with no conspicuous sulfides.

A second productive area is at the intersection of two prominent fracture zones on the topographic nose north of Long Tom Gulch. One zone strikes N. 40° E. and the other N. 25° W.; both appear to be vertical. Apparently Long Tom Gulch occupies the trace of a fault striking N. 85° E. Several shafts were sunk along the gulch for a distance of 900 feet.

Another mineralized fault, striking N. 30° W. and dipping 45° SW. can be traced more than 300 feet along the west bank of a ravine between Pine Mountain Creek and Long Tom Gulch. A body of clay gouge 16 inches wide, containing quartz veinlets and visible gold, lies along the fault plane.

The mine workings are scattered over an area about 2,000 feet square along both sides of Pine Mountain Creek, and consist of at least 18 shafts and inclined shafts, 9 adits, 17 open cuts and 80 prospect pits (fig. 49). Most of the workings are caved and inaccessible.

Mammoth Mine.. Location: SE¼ sec. 35, T. 26 S., R. 32 E., M.D.M., Keysville district, 2¼ miles northwest of Bodfish, half a mile southeast of old Keysville. Ownership: Rudnick Estate Trust, Bakersfield, 12 unpatented claims, three millsites (1958).

The Mammoth mine, the site of one of the earliest gold discoveries in Kern County, was located in 1855 soon after placer gold was found in Greenhorn Gulch a few miles to the southwest. Gold and silver valued at about \$500,000 is reported to have been produced from ore containing an average of less than half an ounce of gold per ton (Tucker, Sampson, 1933, p. 280). The mine has been one of the most consistently productive mines in the southern Sierra Nevada. After its earliest period of activity, in the late 1850s, the Mammoth mine was most productive during the years 1909 through 1915 and again from 1938 through 1941. No later production is known to the writers; a diamond drilling program was completed in recent years, but the results were not disclosed. Late in 1957 one man was engaged part-time in repair and maintenance work.

The deposit consists of two parallel gold-bearing quartz veins which strike about N. 40° E. and dip 70° SE. The widths of the veins average 3 feet, but range from 2 to 15 feet; the gangue consists simply of quartz, fault gouge, and minor proportions of arsenopyrite and pyrrhotite. The gold to silver ratio in the ore has averaged approximately 1: 1, but the silver mineral, if present, has not been identified. The silver probably is present in solid solution with the gold. Mesozoic granodiorite constitutes both the hanging wall and footwall of the veins where observed. Although the footwall is described as being slate in early reports (Tucker and Sampson, 1933, p. 318), no metamorphic rocks were observed in 1958 on the main level or at the surface.

Three distinct ore shoots occur laterally along the vein within a distance of 1,000 feet. These rake to the northeast at angles of about 45° (pl. 8). The most easterly and apparently the largest of the three is the Higgins ore shoot, which has been stoped for a strike distance of 500 feet and vertically 150 feet to the surface. This ore shoot was mined mainly from the 300 level. What is known as the central ore shoot is actually two parallel bodies which rake 45° NE. and are separated by 200 feet of waste. The upper of these, centered on the 150 level, was stoped discontinuously along strike for about 500 feet and vertically some 140 feet. The lower body, which is transected by the main level (400 level), was mined 120 feet along strike and 280 feet vertically. The western-

* By J. Grant Goodwin.

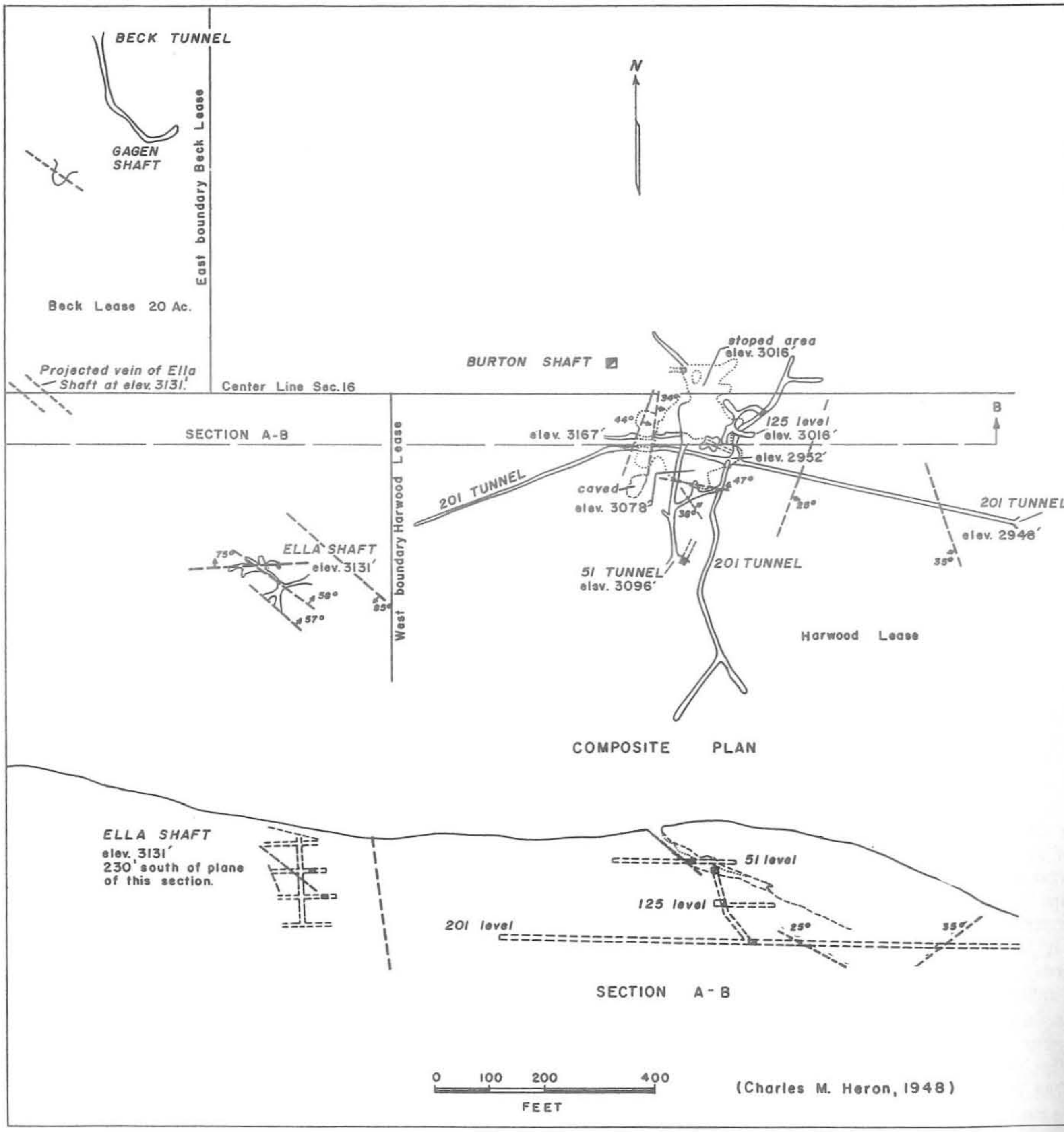


Figure 50. Composite plan and vertical longitudinal projection of the Middle Butte mine.

most, or McGill, ore shoot is less well defined than the other two. It also consists essentially of two parallel ore bodies, each measuring about 140 feet long by 80 feet high, raking 45° NE., and separated by 50 to 75 feet of waste.

All ore shoots are in the footwall vein, even though the hanging wall vein appears to be equally persistent. More extensive exploration may well prove the hanging wall vein to be mineralized.

Underground workings aggregate more than one mile of drifts, crosscuts, raises, and winzes on seven levels (pl. 8). The vein has been explored laterally more than 2,000 feet and to an overall depth of 600 feet. Main level workings are still accessible along most of its 1,700 foot length, but lower levels are flooded; the upper levels are largely caved. The deepest continuous vertical development is No. 1 winze which was sunk 200 feet from the 400 level at a point 760 feet southwest of the portal.

Middle Butte (Trent, Rosamond Kaolin) Mine. Location: SW¼ sec. 16, T. 10 N., R. 13 W., S.B.M., Mojave district, 9 miles northwest of Rosamond, on the southeast part of Middle Butte. Ownership: Middle Butte Mine Co., Inc., c/o Emory L. Morris, and Mary Johnson, San Francisco. Leased to Martin Beck of Rosamond (1958).

Walter Trent of Tonopah, Nevada, leased the Middle Butte property in March 1934 in speculation resulting from discoveries of rich surface gold ore on the adjoining Burton-Brite-Blank mine to the north. In March 1935 Trent found an outcrop of a vein near the north boundary of the property and the results of subsequent sampling indicated a tenor of 3 ounces of gold per ton. Fifteen hundred tons of ore, which yielded an average of $100 per ton, was quickly mined from surface cuts (Julihn and Horton, 1937, p. 7). Shipments from these cuts were made directly to the smelter at Selby, California. Mining and development continued until 1942 when the mine was shut down by order of the War Production Board. The mine remained idle through 1958. In 1949, however, 500 to 600 tons of dump material was milled and cyanided on the dump site, yielding 0.1 to 0.2 ounces of gold per ton.

The mine area is underlain by intermixed rhyolitic breccia and porphyritic rocks of undetermined distribution. Free gold is in two parallel veins 800 feet apart which strike N. 30° W., and dip 50° NE. The main vein is the more northeasterly; its width ranges from 6 to 25 feet, and it has been traced laterally more than 1,500 feet and explored to an inclined depth of 300 feet. The vein has poorly defined walls and little or no surface expression. It has been brecciated and recemented with later quartz which is heavily impregnated with limonitic material. The free gold is associated with small proportions of unidentified silver minerals. The only ore shoot, as developed, was 200 feet long and 10 to 15 feet wide, and extended 100 feet down the dip.

Severe wall-rock alteration has produced irregular zones of impure clay consisting of kaolinite, alunite, quartz, and hydrous iron oxide staining. Selected samples of the clay have been reported by the owners to be refractory (cone 31 (?)). Sparse coatings of autunite are along fractures in the kaolinized porphyritic rocks. Radiation intensity as high as 1.5 MR/hr. was noted by the Atomic Energy Commission in the workings, and five samples taken by them averaged 0.04 percent uranium (Walker, Lovering, and Stephens, 1956, p. 17).

The main vein has been explored by more than 2,500 feet of horizontal workings on three levels designated the 51, 125, and 201 levels (fig. 50). Initial development was an open cut excavated in the zone of highgrade ore discovered by Trent. When mining from the open cut became impractical "51 tunnel" was driven 400 feet northward on the vein and served as a haulage level. The 125 level consists only of a few hundred feet of drift driven to aid in the extraction of the lower parts of the ore shoot. Little ore was removed from the 201 level, but this level was the most extensively explored. A crosscut adit was driven 1,100 feet westward, and at 500 feet from the portal drifts were extended 210 feet northeast and 500 feet southwest.

The Ella vein, 500 feet southwest of the main vein, strikes N. 50° W. and dips 60° NE. The vein averages 5 feet in width and is similar in character to the main vein, but no mineable ore bodies of significance were found.

Development of the Ella vein centered around a 145-foot vertical shaft with an adit level, 50, 100, and 145-foot levels comprising more than 500 feet of workings.

No attempt has been made to mine either clay or uranium at this property.

Minnehaha Mine. Location: Sec. 3, T. 30 S., R. 40 E., M.D.M., Rand district, 1¼ miles southwest of Randsburg on the north flank of Government Peak, Rand Mountains. Ownership: Miss Rose Maginnis, Randsburg, and estates of .... Hansen and J. T. O'Leary own six patented claims (Minnehaha, Sunshine, Rustler, San Diego, Augnes, and Skyscraper) and two unpatented claims (Esparanza and Best Bet); under lease in 1957.

The Minnehaha mine has been worked entirely by lessees, and had been intermittently active since its discovery in July 1895. Its principal periods of activity are 1895-1923, and 1931-41. Hulin (1925, p. 138) estimates that gold valued at $100,000 had been recovered by 1925. Some of the ore contained as much as $120 in gold per ton. Most of the ore was milled in the Red Dog and Windy mills near Johannesburg.

The gold ore is mostly in narrow, highgrade streaks and lenses in veins occupying shear zones and faults in schist. The veins contain local concentrations of scheelite. Most of the gold mineralization is confined to three areas on the Minnehaha claim. The westernmost area is in a small shallow stream channel near the west end of the Minnehaha claim. There, a vein consisting of silicified, brecciated, and iron-stained schist is present in a fault that strikes N. 30° W. and dips 45° NE along the west side of the mine access road. It is truncated to the south by a fault that strikes N. 75° W. and dips 75° NE. Ore

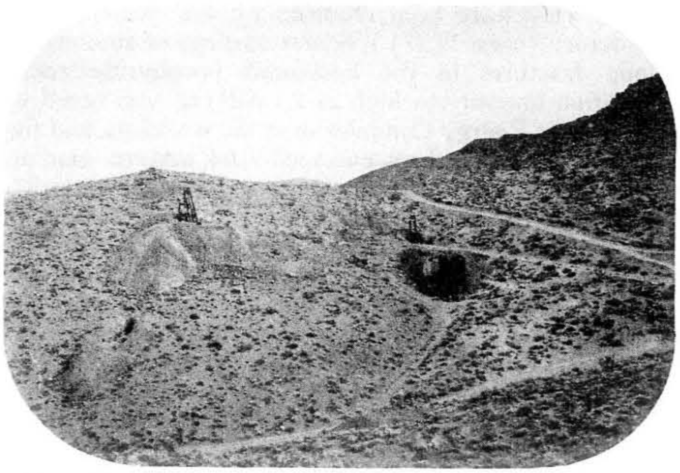


Figure 51. View to east of the central area of the Minnehaha mine. Several veins extend across face of hill.

shoots apparently a few feet in maximum dimension have been mined along the vein to a depth of probably less than 50 feet.

A central area (fig. 51) of mineralization about 150 feet square and at the crest of a small hill, lies about 400 feet east of the west vein. Three veins, 75 to 150 feet long, strike N. 5°-10° W. and dip 65°-80° E. They occupy faults each a few tens of feet apart and are cut off by and interconnected by diagonally trending cross fractures, which also are mineralized. Ore shoots are as much as several tens of feet long and deep and from 1 to 4 feet wide. They are moderately closely spaced, mostly near the surface, and seemingly localized near intersections of faults and fractures. These veins consist of quartz stringers in brecciated, silicified, and iron-stained schists. This area was probably the source of most of the mined ore.

About 400 feet farther northeast is the third zone of mineralization. It is on the northeast edge of the small hill, also near the mine access road. The principal vein in this area strikes N. 25° E. and dips 20°-45° SE. It is probably 300 feet or more in length. Most of the several shoots in this vein are about 4 feet thick, and 20 or more feet in other dimensions. The vein is similar in composition to those in the central area.

The west workings consist of two short west-driven crosscut adits, a few tens of feet of drifts, and short underhand stopes.

The central workings consist of two principal shafts on the westernmost vein in this area, and four or five other shafts. The deepest shaft extends to 300 feet. The others are from 50 to about 150 feet deep. Short crosscut and drift adits were also driven in the central area. The underground workings in this area probably aggregate several hundred feet of workings.

The northeast workings consist mostly of a southwest-driven drift adit above and below which several stopes extend. A vertical shaft of undetermined depth was sunk northeast of the drift-adit portal to intersect the vein in the vicinity of the mine access road.

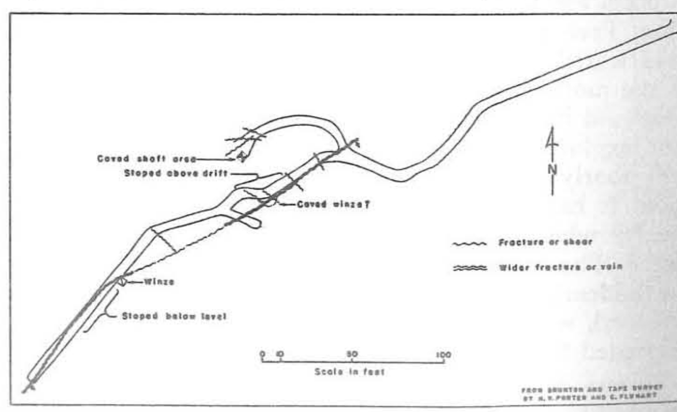
Porter Group (Ederl, McKeadney, McKidney, Old Bodfish, Ophir, Venus). Location: NE¼ sec. 9, T. 28 S., R. 32 E., M.D.M., Clear Creek district, 1¼ miles west-southwest of Havilah and 1 mile south-southwest of O'Brien Hill. Owner: H. V. Porter, Havilah (1957).

The workings now known as the Porter group originally consisted of three mines, the Venus, Ophir, and McKeadney. All of these were opened and most actively mined during the early 1870s. They were relatively inactive from then until 1929 when the three properties were consolidated by Ederl Mines Ltd., and became known as the Ederl group. During the next 3 years from 50 to 100 tons of ore which averaged ⅓ of an ounce of gold per ton was produced. Individual mine production figures are not available, but ore from the Venus is said to have averaged from $20 to $100 per ton (Tucker and Sampson, 1933, p. 299).

The deposit consists mainly of three veins that strike about N. 40° E. and dip steeply southeast in quartz diorite. They are several hundred feet apart and range in width from several inches to 4 feet and persist several hundred feet along the strike. Gangue minerals include very finely disseminated pyrite, arsenopyrite, and pyrrhotite which impart a gray color to the vein quartz. Localization of ore shoots is controlled partly by the intersection of the main vein with vertical cross fractures that trend about N. 50° W.

The main ore shoot in the McKeadney vein, which is the most northwesterly, is 130 feet long on the main level (fig. 52) and extends upward about 200 feet to the surface; it was mined to a depth of 40 feet below the main level from a 200-foot drift driven southwest from the bottom of a 40-foot winze. The downward extension of this ore shoot beneath the 200-foot drift is unexplored, but a 900-foot crosscut adit was driven N. 55° W. from the Ophir claim to intersect the McKeadney vein about 200 feet below this area. The work was dis-

Figure 52. Plan of the main level of the McKeadney vein, Porter group.



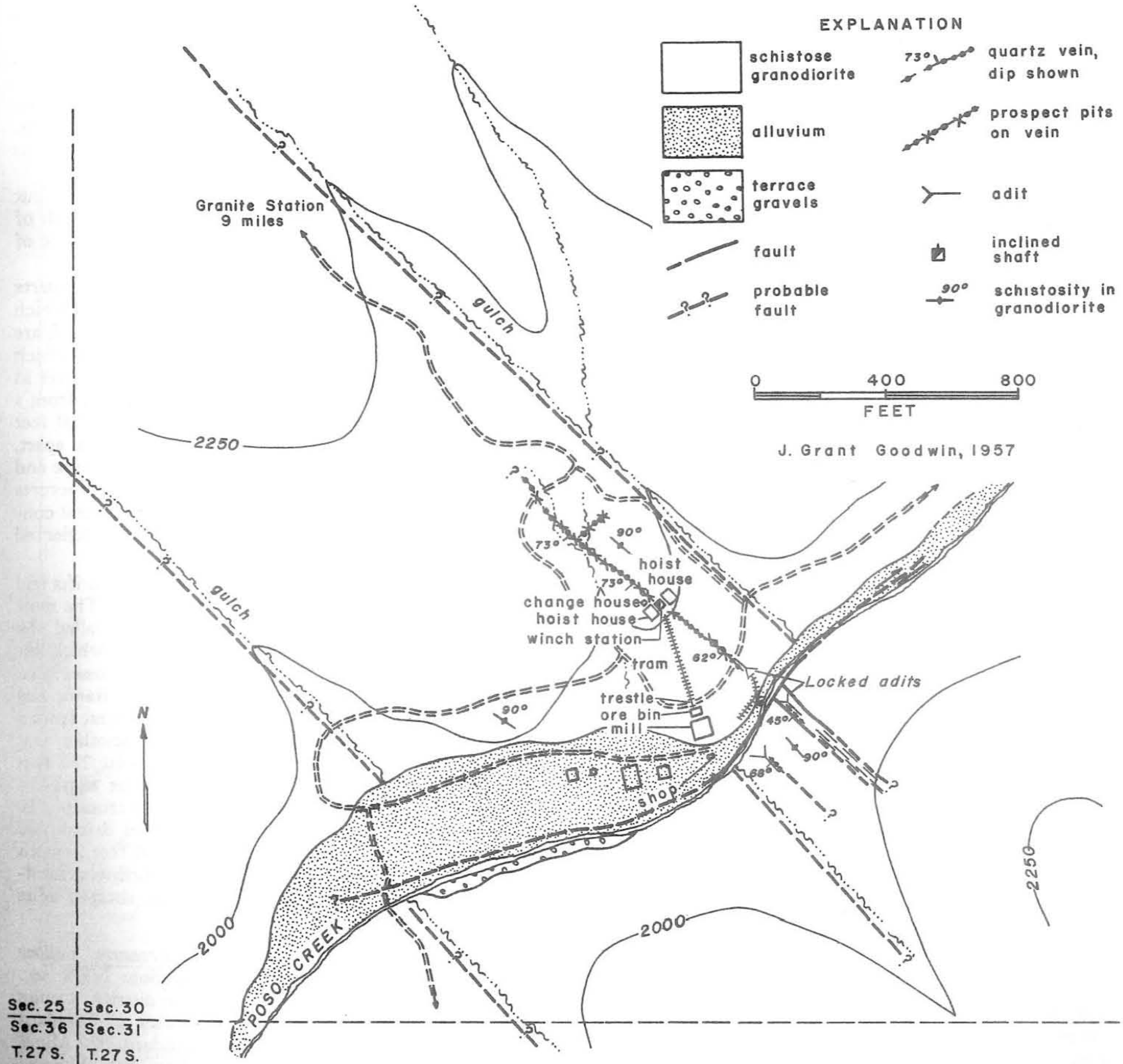


Figure 53. Geologic sketch of the Poso mine.

continued, however, some 1,700 feet short of this goal (Tucker and Sampson, 1933, p. 299). Other development on the Ophir claim includes several crosscut adits driven from 100 to 150 feet northwest to the vein and over 1,000 feet of drifts. All of this development is largely caved.

Three adits, 700, 150, and 150 feet long and a 100-foot shaft comprise the Venus workings which lie southeast of the Ophir mine. They also are largely caved. During 1957 a 40-foot winze from the main level of the McKeadney mine was being dewatered.

*Poso Mine.** Location: SW¼ sec. 30, T. 27 S., R. 30 E., M.D.M. about 6 miles southeast of Granite Station, 1½ miles southwest of Pine Mountain. Ownership: Bill Fritz, Mission Hotel, Bakersfield (9 lode claims); Mr. Longway, 616 E. 18th St., Bakersfield (2 lode claims, 1

* By J. Grant Goodwin.

placer claim); and Mr. H. H. Stepp, Granite Station (1 lode claim, 4 placer claims) (1957).

The Poso mine was first worked in 1923 by the Poso Mining and Milling Co., E. W. McCutchin, president, Bakersfield. It was last worked during 1938 by Frank Leckliter, Bakersfield. Total recorded output is about 350 tons of ore that yielded an average of 0.36 ounce of gold and 0.2 ounce of silver per ton. In 1957 the mine and a mill on the property remained fully equipped and in fair condition.

Medium- to fine-grained foliated hornblende granodiorite underlies the mine area. Deep northwest-trending gulches bound the mine area on both sides and probably mark the trace of steeply dipping faults (fig. 53). To the southeast, counterparts of these gulches appear to be offset to the southwest by a fault trending N. 45° E. along Poso Creek. Apparent horizontal offset is 200 feet. The main vein is offset a like distance.

The main ore bodies are in a quartz vein about 2½ feet wide which strikes N. 50° W. and dips 60°-70° SW. It is exposed in test pits over a distance of 800 feet. Sheared Mesozoic granodiorite occurs on the foot- and hanging walls and the quartz vein-filling is fractured and broken into sheets from half an inch to 2 inches wide parallel to the walls of the vein. Ore shoots contain free-milling gold associated with sparse pyrite. The width of the vein is uniform over a distance of 700 feet northwest of Poso Creek but narrows beyond that point. Although the faulted segment southeast of the fault along Poso Creek is persistent and 10 to 14 inches wide, the quartz in the zone diminishes to the southeast.

A parallel vein about 200 feet northeast of the main vein crops out on the south bank at Poso Creek. This vein is a complex of narrow quartz stringers about 2 inches in maximum width in a gouge zone 25 feet wide. The gouge zone appears to be nearly vertical but the veinlets within it dip 45° SW. A poorly exposed third vein that strikes N. 50° E. and dips 30° NW. intersects the main vein near its northwestern extremity.

The main vein was developed by a 73° inclined two-compartment shaft sunk to a reported depth of 370 feet. An adit on the 120-foot level was driven 865 feet northwest along the vein from Poso Creek, intersecting the shaft at a point 365 feet from the portal. At 210 feet from the portal, an ore shoot was encountered and an undetermined amount of stoping was done along the 150-foot length of the ore body.

On the south offset extension of the main vein an adit was driven S. 50° E. a distance of 130 feet. Other workings consist of short adits and numerous test pits.

Rand Group (Claybank, Confidence, Oro Fino, Relief, St. Charles Mines). Location: SW¼ sec. 3 T. 28 S., R. 32 E., M.D.M., Clear Creek district, three-quarters of a mile northwest of Havilah on the southeast flank of O'Brien Hill. Owner: Loring F. Bennett and Alice C. Rynn, Los Angeles. Leased to Jess L. Bennett and L. F. Bennett, Box 67, Bodfish (1957). The Rand group comprises an undetermined number of patented and unpatented claims which were among the first to be mined in the district.

The principal period of activity at the Rand group was from 1860 to 1880, during which time the whole district flourished. Since 1880, the mines of this group have been worked intermittently, and with little new development. Late in 1957 one man was engaged in exploration and was constructing a gasoline-powered arrastre.

Accurate total production figures are not available, but the group has yielded a minimum of $125,000 worth of gold from ore that averaged more than half an ounce of gold per ton.

The deposit consists of six principal sub-parallel quartz veins in Mesozoic biotite quartz diorite. The veins, which strike about N. 45° E., and dip steeply southeastward, are composed principally of quartz and fault gouge in which are pyrite, arsenopyrite, free gold, and traces of silver in a gold-silver ratio of 5 to 1. They range in width from a few inches to 6 feet, and can be traced at least 300 feet laterally. They are normally from 20 to 40 feet apart, although at some points two adjacent veins converge and connect. Ore shoots are at the junction of cross fractures at some points, but in other ore streaks no structural controls are apparent. The tenor of the vein is not reflected by the proportion of sulfides present.

Workings consist of several thousand feet of drifts and crosscuts and several shafts and raises (fig. 54). The most extensive workings are appended to an adit called the Rand Tunnel. This adit consists of a crosscut which extends about 500 feet west, and presumably crosses four of the principal veins—the Howe, Oro Fino, Rand, and Confidence. A 75-foot drift was driven southwest from a point about 120 feet west of the portal; another was driven about 240 feet southwest from a point 280 feet west; and a third was driven about 200 feet northeast from a point about 350 feet west. A second crosscut 250 feet northwest and 50 to 75 feet above was driven 100 feet west to the Confidence vein, then 100 feet in both directions on the vein. Late in 1957 the northwest heading was being advanced. Several other shorter adits honeycomb the area.

Standard Group (includes *Exposed Treasure, Yellow Rover*, and *Desert Queen Mines*). Location: NE¼ sec. 32, T. 11 N., R. 12 W., S.B.M., Mojave district, 3 miles south of Mojave on the southwestern face of Standard Hill (Elephant Butte). Ownership: Standard Hill Mines Co., Earl Blickenstaff, pres., P.O. Box 392, Mojave; twelve unpatented and five patented claims (1959).

The first discovery of gold in the Mojave district was that by George Bowers of the Yellow Rover vein in 1894. Bowers gathered and shipped two rail carloads of ore from the surface which was valued at $1,600 in gold and silver. Soon after this discovery the Exposed Treasure, Desert Queen, and other veins on Standard Hill were discovered and developed. About 1900, the Exposed Treasure and Yellow Rover mines were consolidated under the Exposed Treasure Gold Mining Co., and in 1901 a 20-stamp mill and 60-ton cyanide plant were erected.

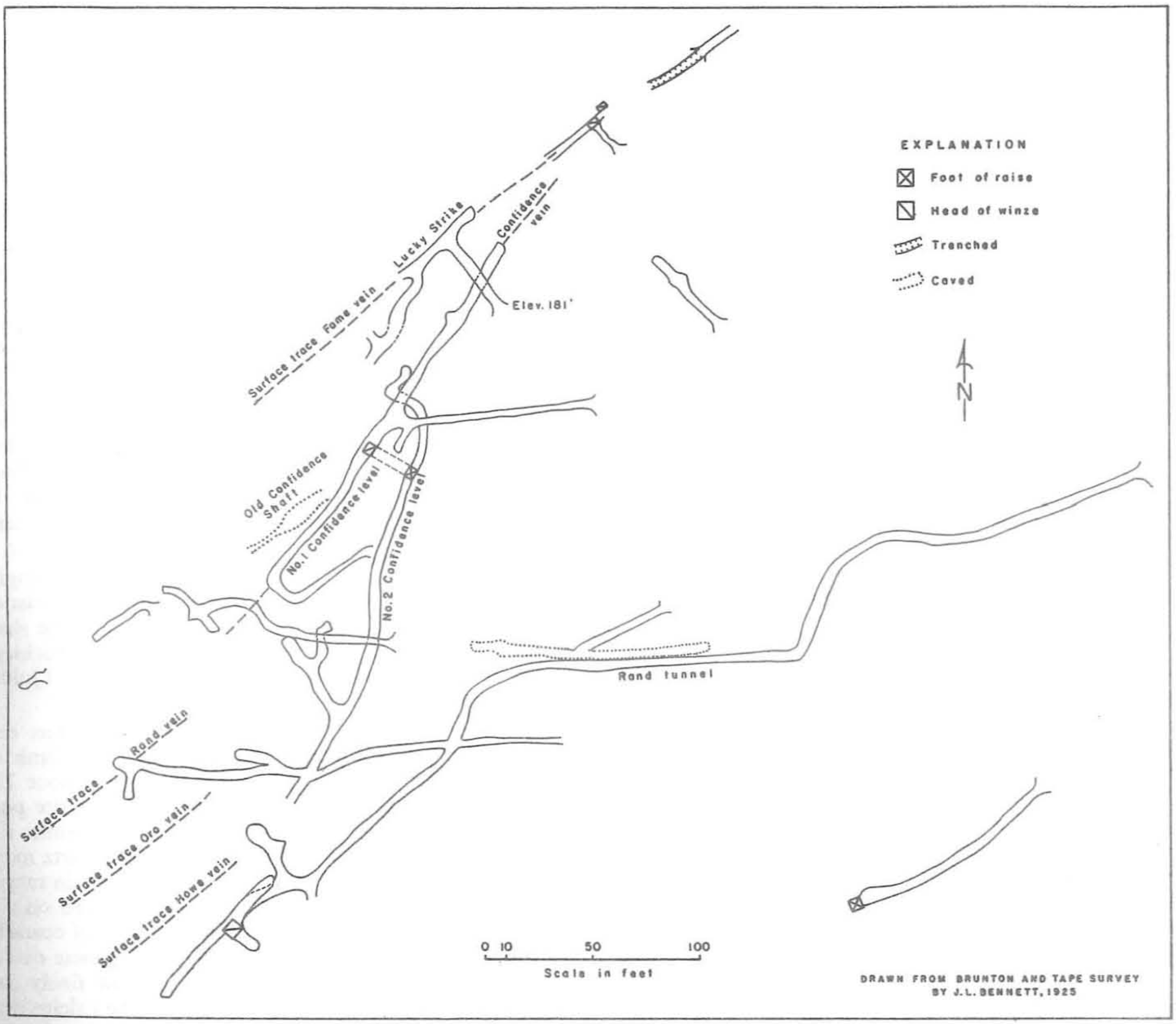


Figure 54. Plan of the Rand group workings, Clear Creek district.

In 1912 Mojave Consolidated Gold Mines purchased all mines on the hill and operated them until 1915. Mining was resumed in 1921 by the newly formed Standard Mining and Milling Co. who operated the mines until 1928. During the period 1928-40 mining was done mostly by lessees who probably shipped the ore to the Tropico mill, 10 miles to the southwest. In 1940, the present owners, Standard Hill Mines Co., purchased the property and mined it until 1942, and intermittently between 1945 and 1956. The mine was idle in 1958. Total value of gold and silver recovered from the group since 1894 is estimated to be $3,500,000 (Earl Blickenstaff, 1958, personal communication). The Exposed Treasure vein is credited with 70 to 85 percent of this amount.

Standard Hill is underlain by Mesozoic quartz monzonite which was intruded by Tertiary dikes of quartz latite porphyry. The most prominent parts of the hill are underlain by the quartz latite porphyry, and intervening areas of subdued relief are underlain by quartz monzonite. In general, the dikes appear to strike north. Gold and silver mineralization has taken place in a series of sub-parallel epithermal fissure veins which strike from N. 15° E. to N. 45° W. and dip from 25° to 70° SE. to NE. These veins are most commonly along the borders of the dikes. The principal veins, from east to west, are the Exposed Treasure, Yellow Rover, and Desert Queen; the veins are several hundred feet apart.

Figure 55. View south of the Exposed Treasure vein, Standard group. Mine shaft in background and stope in foreground lie above the most productive portion of the vein.

The Exposed Treasure vein crops out on the east flank of a small ridge on the southwest part of Standard Hill (fig. 55) and along the west side of the main body of the hill. The southeastern part of the vein strikes N. 15° W. and dips 40° NE. at the surface. Farther northwest the vein swings sharply west over the ridge then strikes N. 45° W. along the northwest flank of the hill. The vein swings almost due north at its northernmost exposures. The dip of the vein ranges from a maximum of 60° NE. at the surface, near the main shaft in the southern part of the vein, to a minimum of 28° NE. on the 900 level of the shaft (Julihn and Horton, 1937, p. 26); the average dip along the surface is about 40°. Exposures of the vein have been traced 3,000 feet on the surface and explored more than 900 feet down dip. The vein ranges in width from 2 to 20 feet and averages 6 feet (Julihn and Horton, 1937, p. 26).

As determined from stopes, the largest ore shoot extended from a point about 50 feet northwest of the main shaft 150 feet northwest to the sharp bend in strike. The lower limit of this ore body apparently was at the 500 level of the mine. Two other smaller ore shoots were found near the surface on the northern part of the vein.

In the southern part of the vein quartz latite porphyry forms the hanging wall at the surface and the footwall is quartz monzonite; however, quartz latite porphyry is encountered about 10 feet into the footwall. Below the 100 level the hanging wall is quartz monzonite; porphyry forms the footwall between the 100 and 400 levels, and quartz monzonite forms both walls below the 400 level (Julihn and Horton, 1937, p. 26). The principal ore minerals in the Exposed Treasure vein are cerargyrite and finely disseminated free gold. They are in a gangue of much-altered wall rock and quartz with smaller proportions of pyrite, aresnopyrite, calcite, galena, cerussite, chalcopyrite, bornite, azurite, and malachite (Julihn and Horton, 1937, p. 26).

The Exposed Treasure vein is developed by an inclined shaft sunk to a depth of 900 feet on the vein with levels at 100-foot intervals. The most extensive workings are on the 300 level where a drift extends 550 feet southeastward and over 700 feet northeastward from the shaft. Total horizontal workings exceed 10,000 feet (fig. 56).

The Yellow Rover vein crops out 930 feet northeast of the Exposed Treasure vein along the western side of a north-trending ridge. It strikes N. 5° W., and dips 60° NE. Quartz latite porphyry forms the hanging wall and quartz monzonite the footwall. The vein ranges in width from 1 to 3 feet, has been mined to a depth of 300 feet on the incline, and can be traced for more than 1,000 feet on the surface. Although the vein is similar in composition to the Exposed Treasure vein, the vein fault can be divided into four distinct parts: a hanging wall shear zone, 1 to 2 feet wide, of the very fine gouge; an intermediate zone, 3 to 5 feet wide, of decomposed but relatively unsheared footwall rock; a mineralized zone, 1 to 3 feet wide, and a brecciated footwall zone, 5 to 10 feet wide, containing clay-sized particles to boulder-size fragments. Fragments of terminated quartz crystals in the footwall zone suggest at least one period of post-mineral movement.

The Yellow Rover vein was developed by a single-compartment inclined shaft in a small divide northeast of the main shaft on the Exposed Treasure vein. The shaft is 290 feet deep with four levels. Horizontal workings total more than 2,000 feet on the second level (Julihn and Horton, 1937, p. 26).

The Desert Queen vein crops out about 550 feet east of the Yellow Rover shaft along the northeast flank of Standard Hill. It strikes N. 15° E. and dips about 70° SE. From the surface to the 300 level quartz latite porphyry forms the hanging wall and quartz monzonite the footwall. Below the 300 level both walls are quartz monzonite (Julihn and Horton, 1937, p. 26). The vein ranges in thickness from 2 to 6 feet and can be traced on the surface for more than 800 feet. It is composed of coarsely crystalline calcite heavily stained with manganese oxides and hydrous iron oxides. The gold is free and finely disseminated in lenticular quartz stringers in the calcite. Pyrite, arsenopyrite, and other sulfides are also in the stringers.

Development on the Yellow Rover vein consists of a 400-foot inclined shaft with four levels at about 100-foot intervals. The horizontal workings total more than 3,000 feet and include an 1,100-foot crosscut driven west-southwest on the 380 level from a point near the shaft. The Yellow Rover vein was intersected at 510 feet, the Exposed Treasure at 1,100 feet, four smaller intervening veins were crossed at 100, 590, 630, and 800 feet (Tucker, 1923, p. 161). The crosscut was flooded in 1928 by water issuing from the Exposed Treasure vein. Below the 400 level is a 200-foot drift which was driven south from the west end of a 365-foot crosscut driven west from the 300 level of the Four Star mine to the east.

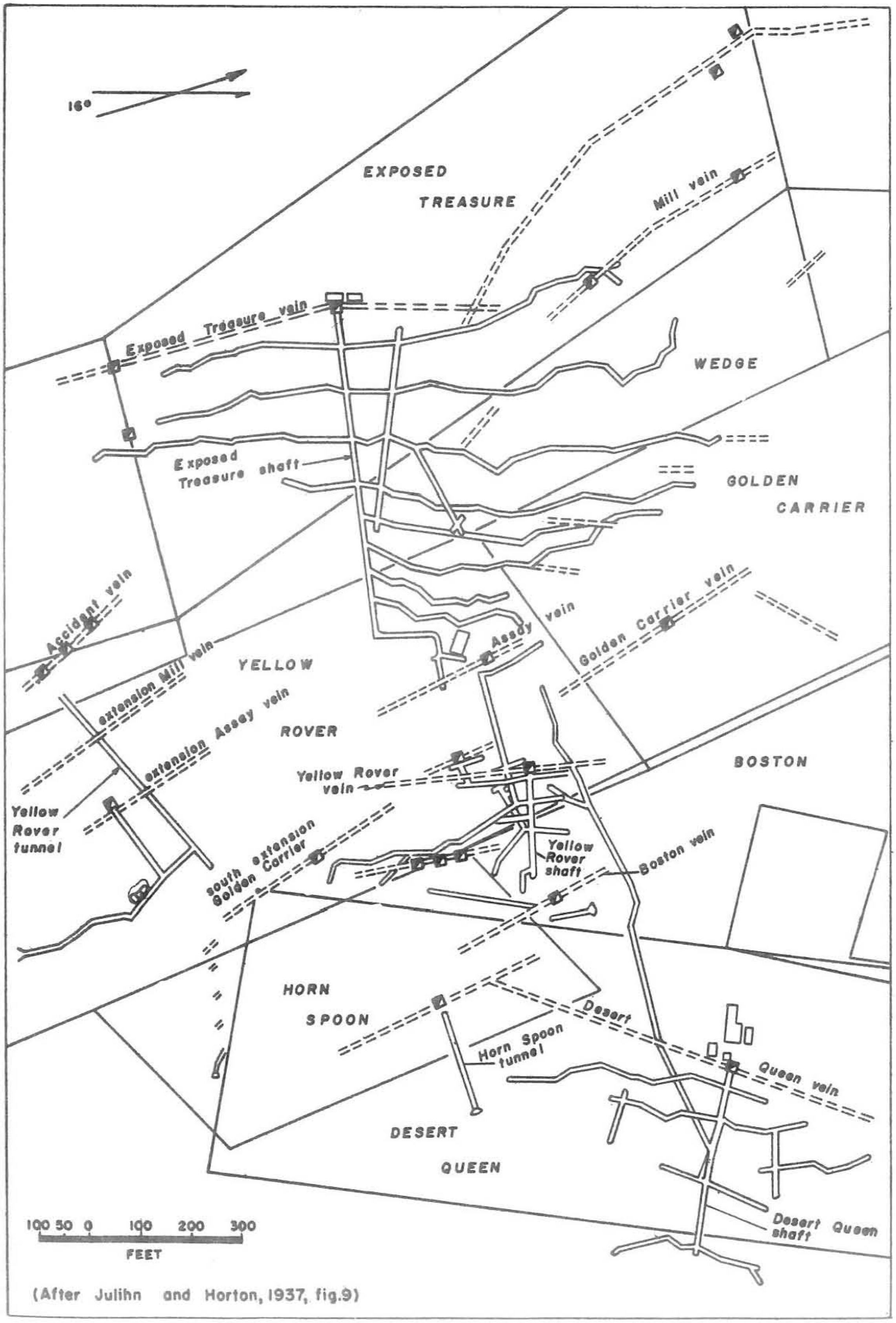


Figure 56. Composite plan of the Standard group (Desert Queen, Exposed Treasure, and Yellow Rover mines).

St. John Mine. Location: Sec. 33, T. 28 S., R. 35 E., and NE¼ sec. 4, T. 29 S., R. 35 E., M.D.M., 16 miles southeast of Weldon, on the south side of the road that crosses the divide at the north end of Kelso Valley. Ownership: Karl Struss and Ethel Struss, 1343 N. Orange Grove Ave., Los Angeles 46 (1956).

The St. John mine was operated by Senators Jones and Stewart of Nevada from 1860, the year of its discovery, until 1875. They recovered $700,000 in gold and silver during the 15-year period (Tucker and Sampson, 1933, p. 279) then suspended operations. Since 1875, intermittent mining activities by several operators have resulted in the recovery of only a few hundred ounces of gold, mostly during 1891-1900, 1935-38, 1946, and 1950. Some of the gold recovered since 1875 has been obtained from dumps and mill tailings which were reported to contain from $5 to $15 per ton in gold (Tucker, 1929, p. 48).

The principal rock in the vicinity of the St. John mine is Mesozoic granodiorite. Several aplite dikes from 2 to 3 feet wide intrude the granodiorite. A quartz monzonite dike from 3 to 20 feet wide, which also intrudes the granodiorite, appears to be the principal structural control for ore localization. The main vein strikes N. 50° W., and dips 35°-45° SW in a fault zone along one side of the quartz monzonite dike (Tucker, Sampson, and Oakeshott, 1949, p. 233). The vein ranges in width from a few inches to more than 4 feet and is several hundred feet long. It is a quartz-filled gouge zone which contains free gold, auriferous pyrite, stibnite, arsenopyrite, and galena. Fractures within the fault zone are irregular, in places quite numerous and closely spaced, and many of them extend away from the vein into either the hanging wall or footwall. The vein is offset in many places by faults of varying displacement and strike. Two sets of transverse faults offset the vein horizontally from 3 to 150 feet. One set is vertical and strikes east; the other set strikes N. 75° E. and dips 50°-60° SW. In addition, longitudinal dip-slip faults strike parallel to the vein and dip 30°-60° SW.

The St. John mine probably contains several hundred feet of workings, but most of those driven before 1875 are inaccessible. The deepest shaft is inclined 600 feet near the northwest end of the main vein. It was the main shaft before 1875 but is now caved at the collar. A 350-foot inclined shaft is 175 feet southeast of the main shaft, and a 300-foot inclined shaft is 160 feet farther southeast. Still farther southeast are several shafts from 50 to 100 feet deep. A 300-foot level connects the 300-foot and 350-foot shafts and connects farther northwest with an old drift extended southeast from the main shaft. A faulted segment of the vein formerly worked from the main shaft was mined from this northwest drift during 1935-38.

Sunshine Mine. Location: NE corner sec. 11, T. 30 S., R. 40 E., M.D.M., Rand district, 1¾ miles south-southeast of Randsburg, on the east side of a small hill on the southeast side of the Rand Mountains. Ownership: T. W. Atkinson estate, A. P. Barnhart, agent, Bakersfield, owns one patented claim (1957).

The Sunshine gold mine has been operated intermittently since 1896; the principal periods of mining were 1896-1915, 1931-37, 1938-48. Total production probably lies within the range of $400,000 (Partridge, 1941, p. 290) to $1,060,000 (Hulin, 1925, p. 144). About 90 percent of the gold was produced during the period 1896-1915. The average gold content of the ore ranged from 1½ ounces per ton in ore mined between 1899 and 1915 to half an ounce per ton in ore mined between 1938 and 1948 (Stryker and Harrell, personal communication, 1957). The most recent mining was in 1948 by W. A. Stryker and Louis Harrell, Johannesburg.

The Sunshine vein is a gold-bearing quartz vein in Rand schist. Unlike most of the gold veins in the Rand district, it is composed of quartz rather than silicified schist. According to several lessees of the mine it also has yielded the coarsest gold in the Randsburg area (Earl Blickenstaff, William Stryker, Bert Wegman, personal communications), the largest grains of gold being about the size of wheat grains or larger. The similar, parallel, but less productive La Crosse vein crops out at La Crosse mine immediately west of the Sunshine mine.

The Sunshine vein is vertical and strikes N. 80° E. It is from 6 to 12 inches wide, about 500 feet long, and extends to a depth of 600 feet. Both walls of the vein are well defined. The gold is both free in quartz and associated with pyrite, arsenopyrite, and—less commonly—with scheelite. The vein is offset a few feet by each of several faults and is terminated by major cross faults approximately 500 feet apart. The west cross fault is described only from an underground position in the mine (Tucker 1929, p. 49). It dips 50° SE. and cuts the Sunshine vein 57 feet west of the main shaft at the 400 level of the mine. The east cross fault is vertical and intersects the Sunshine vein 230 feet east of the main shaft.

The Sunshine mine workings consist of a 600-foot vertical shaft and a total of about 3,000 feet of drifts on five levels spaced at 100-foot vertical intervals. Much of the mined material was presumably removed in open stopes. The shaft was sunk to a depth of 500 feet sometime between 1904 and 1914.

A three-stamp mill and cyanide plant were used for many years prior to 1929, but they are no longer on the property.

Tropico (Big Three, Big Tree, Gold King, Hamilton) Mine (includes *Home, Fairview, Kidd, Lida Mines*). Location: Secs. 10, 11, 14, 15, T. 9 N., R. 12 W., S.B.M., in the Mojave district, 4 miles northwest of Rosamond on Tropico Hill. Ownership: Burton Bros. Inc., Clifford G. Burton, president, of Rosamond owns twelve patented and four unpatented mining claims (1958).

Gold was discovered on Tropico Hill about 1900 and by 1904 at least four mines—the Fairview, Big Tree, Gold King, and Lida had been opened. The Lida was the most productive of these, and by 1907 had yielded more than 8,000 tons of ore which averaged 1.2 ounces of gold and

7.5 ounces of silver per ton. In 1910, the Tropico Mining and Milling Company was formed and it subsequently acquired most of Tropico Hill. The company gradually came under the control of H. Clifford Burton and his brother Cecil Burton, and by the mid-1930s they were the sole owners. The growth of mining in the Mojave district during the period 1933-42 was facilitated by the existence at Tropico Hill of the Burtons' mill at which custom milling was done. In 1935, this mill received ore from 160 shippers in four mining districts (Julihn and Horton, 1937, p. 39, 40). Mining and milling ceased during the war years 1942-45, but mining was resumed in 1945. The mounting costs of mining finally caused the Tropico mine to be shut down in 1952. Custom milling, however, was done until 1956. Through 1952, mines on Tropico Hill yielded 300,000 tons of ore which averaged 0.38 ounces of gold and 0.43 ounces of silver per ton.

Tropico Hill is underlain by Mesozoic quartz monzonite which is overlain by volcanic agglomerate and Tropico group continental sediments; these rocks are intruded by numerous bodies of later Tertiary rhyolite breccia, and rhyolitic porphyry. Most of the gold has been obtained from four veins in rhyolitic breccia and rhyolite. The veins strike due east and dip 60° to 70° S. From south to north the veins are designated the Home, North No. 1, North No. 2, and the Lida; they are 125, 200, and 300 feet apart. The Home vein, the most productive, crops out about 500 feet south of the crest of Tropico Hill. It ranges in width from 3 to 20 feet but averages 6 feet. The vein is exposed laterally for 4,000 feet and has been mined to a depth of 900 feet measured in the plane of the vein. Most of the several ore shoots in the Home vein were 200 to 300 feet in strike-length and raked about 50° westward. Most of them extended 100 to 400 feet parallel to the rake.

The ore shoots are rather closely spaced into three groups. The largest group is clustered near the Home shaft, which is on the central part of the hill. It extends about 700 feet along strike and is mined to the 750 level. As a unit the group rakes 50° west as do most of the individual ore shoots. A second group of ore bodies is centered about the Fairview shaft which is 880 feet to the east of the Home shaft. This group has been mined along an average strike-length of about 500 feet and stoped to a depth of 750 feet. In general, the group rakes steeply to the west. A third group of ore shoots is centered about the Kidd shaft about 960 feet west of the Tropico shaft. This group has been mined laterally an average of 400 feet and principally from the 300 level of the Tropico shaft to the 750 level of the Kidd shaft. As in the first group this group rakes about 50° W.

The Home vein is composed principally of brecciated and recemented quartz with minor proportions of pyrite, which near the surface, is largely oxidized to hydrous iron oxides. The only ore mineral is fine free gold which averages about 800 fine in gold (Gardner, 1954, p. 56).

The Home vein was mined initially from a glory hole in the central part of the hill and later through the Home, Kidd, and Fairview shafts (pl. 9). These shafts were each sunk to an inclined depth of about 900 feet with levels at approximately 100-foot vertical intervals, and provides access to over 18,000 feet of horizontal workings. The 100 level of the Home shaft is connected to a 125-foot crosscut adit at the shaft and serves as a haulage level to the mill for both the Home and Fairview shafts. The Fairview shaft is collared at the same elevation as the 100 level of the Home shaft.

The North No. 1 vein is very poorly exposed at the surface and it was explored mostly by crosscuts that extend north from the Home vein. The main ore body of this vein was between the 200 and 500 levels, and was mined a lateral distance of 125 feet. Crosscuts on the 200, 300, 400, 500, and 600 levels connect the Home vein drifts with North No. 1 vein drifts; crosscuts on the 300 level and 400 level also extend farther north to the North No. 2 and Lida veins. Drifts were extended for short distances on North No. 2 vein but apparently no ore was found.

The Lida vein, most northerly of the four veins, crops out along the north flank of Tropico Hill about 300 feet north of the crest. It has been explored laterally for at least 2,070 feet and to a depth of 400 feet. The principal ore body was mined along a 120-foot length from the surface to the 300 level where it apparently bottomed.

The Lida vein is developed by a 300-foot inclined shaft about 1,300 feet northwest of the Tropico shaft and has five levels aggregating about 1,500 feet of drifts. The Ella shaft, 1,100 feet east of the Lida shaft was sunk to a depth of 200 feet and has two levels. Little drifting was done from this shaft. A crosscut to the Lida vein from the Home vein on the 400 level of the Home vein intersected the Lida vein at a point about 300 feet west of the Ella shaft, and drifts were driven 100 feet east and 200 feet west from the crosscut. No ore was found on that level.

Wegman (Eureka, Grace Group, Karma) Mine. Location: NW¼ sec. 6, T. 10 N., R. 12 W., S.B.M., Mojave district, 4½ miles southwest of Mojave on the northeast slope of Soledad Mountain. Ownership: Bert Wegman, P.O. Box 195, Randsburg, owns 80 acres of patented ground and six unpatented claims adjoining on the south (1958).

The Wegman mine, generally known as the Karma mine, was discovered in 1896 and was operated by the Karma Mining Company until 1918. Ore mined and shipped during the first 7 years of production contained an average of 50 ounces of silver per ton (Julihn and Horton, 1937, p. 22). A 20-stamp mill was constructed at the mine in 1904 for the treatment of lower grade ore; in 1909 the mine was shut down because of poor recovery. The mine was reactivated in 1917 when the United States Smelting and Refining Company at Kennett agreed to accept low-grade ore for the contained high percentage of silica. No smelting charge was made. E. L. Wegman purchased the property in 1918 and until 1926 continued to mine for shipment to Kennett low-grade ore that contained from 5 to 9 ounces of silver per ton.

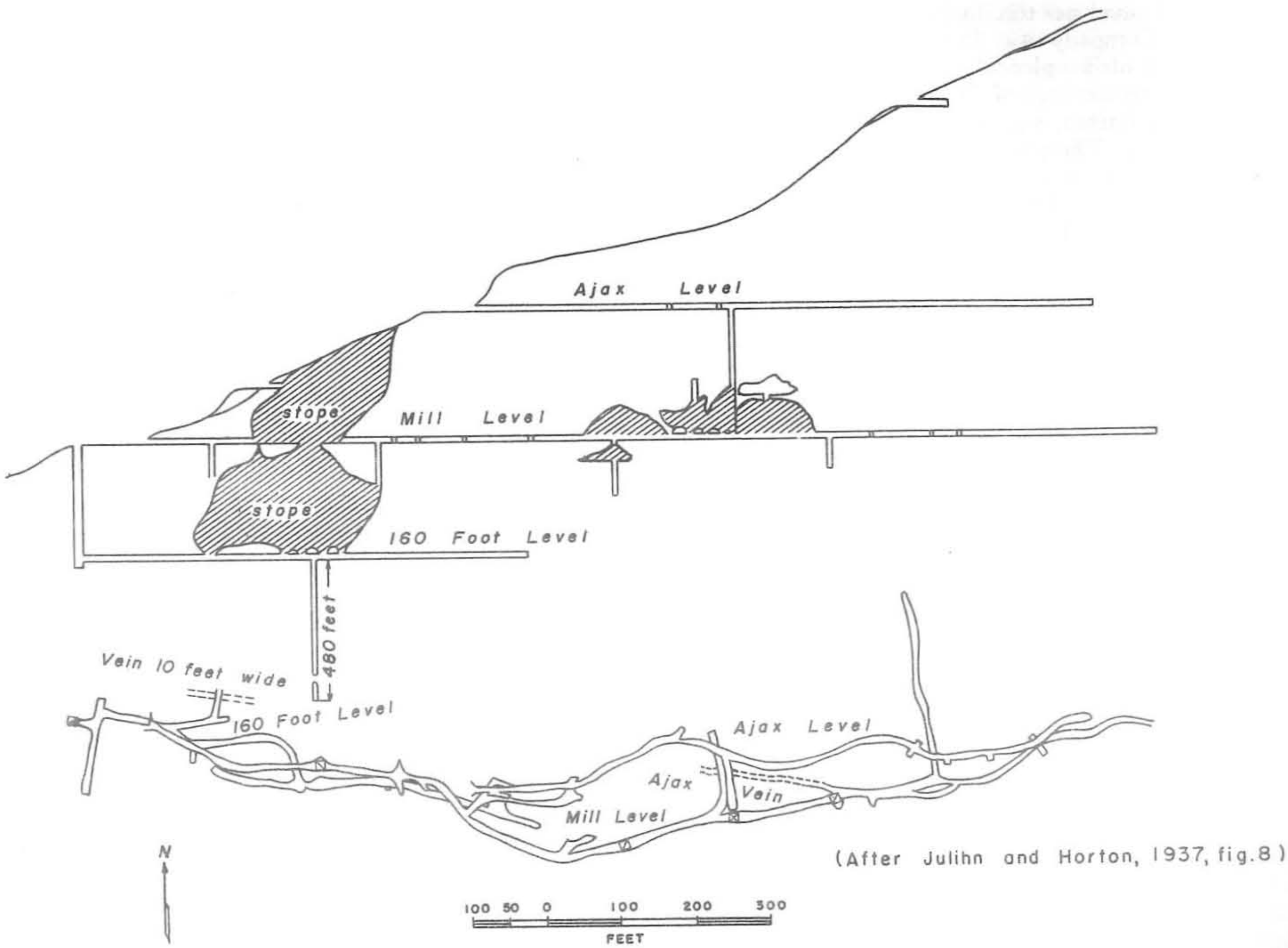


Figure 57. Composite plan and longitudinal projection of the Wegman mine.

During 1937-41, ore was shipped to the Golden Queen mill half a mile to the west. A very limited amount of mining was done in 1951 following a discovery of a narrow vein southeast of the Ajax vein above the old workings. Twenty-seven tons of ore from this vein contained over 7,000 ounces of silver, 10 ounces of gold, 251 pounds of lead, and 40 pounds of copper. Subsequent work, however, revealed that the vein was narrow and difficult to mine. In 1958, two men were crosscutting west from the main haulage way on the mill level.

The Wegman mine area is underlain by quartz latite porphyry, rhyolite breccia, and fine-grained flow-banded rhyolite. Quartz latite porphyry is the most abundant wall rock in the stoped areas, although several sub-parallel fissure veins traverse all of the rock units. Most of the veins strike N. 20° W. and dip 60° NE. to 60° SW. The principal veins are, from west to east, the Karma, Ajax, and Reymert.

The Karma vein strikes N. 25° W. and dips about 80° NE.; it ranges from 4 to 15 feet in width, and can be traced for several thousand feet on the surface. It has been prospected to a depth of 640 feet below the main haulage level. Cerargyrite is the principal ore mineral and is accompanied by gold, argentite, chalcopyrite, and locally, stibnite and galena. Gangue minerals include quartz, pyrite, and limonite.

The main ore body was discovered on the surface between the portals of the Ajax and the Mill levels. It was tabular in shape and measured about 200 feet laterally, 250 feet vertically, and was an average of 12 feet in width (fig. 57). Initial development of the ore was by means of a glory hole and an open stope from the Mill level. On the Mill level the ore zone extends approximately 140 feet southeast from a point 150 feet from the portal. A second ore body on the same level was mined to 50 feet above the drift for a distance of 200 feet from a point 600 feet southeast of the portal. Several crosscuts were extended, mainly into the hanging wall, to explore the adjacent Ajax vein, but no ore was proved.

A lower extension of the main or Karma ore body was mined from the 160 level, accessible through a 160-

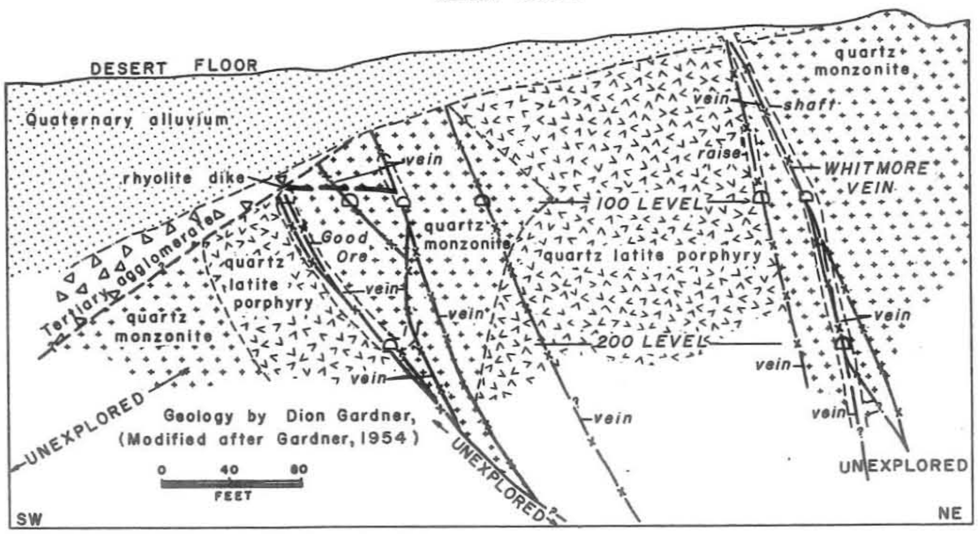


Figure 58. Transverse section of the Whitmore mine, view to the northwest.

foot shaft sunk about 100 feet northwest of the Mill level portal. The 160 level was driven southeastward 650 feet on the Karma vein with several crosscuts extended into the foot and hanging walls. The longest of these are a 100-foot crosscut driven west adjacent to the shaft and a 50-foot crosscut extended east from a point 200 feet southeast of the shaft. A low-grade vein, 10 feet wide, was exposed in the east-driven crosscut. A 480-foot winze was sunk along the Karma vein under the Karma ore body, but no mineable ore was found.

The Ajax vein was explored from the Ajax drift adit which is 175 feet above and 450 southeast of the Mill level portal. This adit was driven 900 feet on the vein, and crosscuts were extended just over the smaller ore body to the Karma vein. The two levels are connected by an air raise at this point.

Little exploration other than the development of trenches, shallow prospect shafts, and short adits has been done on the other smaller veins to the northeast.

The most promising of these veins, perhaps, is the Reymert vein, which is 500 feet east of the Ajax vein, strikes N. 18° W., dips 60° SW., is 10 feet wide, and contains as much as $15 in silver (Julihn and Horton, 1937, p. 22). It has been explored by 90-foot and 150-foot shafts and a 60-foot drift adit.

Whitmore Mine. Location: SW¼ sec. 32, T. 11 N., R. 12 W., S.B.M., Mojave district, 3 miles south of Mojave, on the desert floor a few hundred feet southwest of Standard Hill. Ownership: Whitmore Mine Inc., Mr. Earl Oakley, president, 408 S. Spring St., Los Angeles 13 (1958).

The Whitmore mine was worked as early as 1912 by the St. Mary Mining Company. It was later acquired by W. K. and J. E. Whitmore who operated the mine intermittently until about 1936 when it became the property of Whitmore Mine Inc. of Los Angeles. The most productive mining periods were 1936-42, when 4,500 tons of ore was shipped, and 1948-52 when about 2,300 tons was shipped. Total recorded production for the mine exceeds 7,500 tons of ore which contained an average of 0.3 ounces of gold and 8 ounces of silver per ton.

The ore is in two parallel veins of iron-stained quartz, about 300 feet apart, along contacts between Tertiary quartz-latite porphyry dikes and Mesozoic quartz monzonite (fig. 58). Several intervening weaker veins, between the principal veins in both rock types, have not been developed. The veins and dikes strike about N. 30° W. and dip from 60° to 80° NE. The veins are from 2 to 6 feet wide and the dikes are several tens of feet wide. The principal ore minerals are fine, free gold and cerargyrite. Pyrite, arsenopyrite, and other sulfides also are found in the quartz. Narrow barren stringers of calcite are common near the hanging wall of the most westerly vein (Julihn and Horton, 1937, p. 27).

Development consists of three shafts and several hundred feet of horizontal workings. The most westerly and principal shaft is the No. 1 shaft. It was sunk 225 feet on the inclined vein, thence vertically into the footwall to a total depth of 300 feet. Drifts were driven 165 feet north and 60 feet south on the 200 level. A crosscut was extended about 250 feet southwestward from the south drift of the 200 level to a footwall vein on which a drift was driven an undetermined distance southeast. A crosscut on the 270 level was extended 70 feet east to the vein where a crosscut and drifts of undetermined length were extended (Julihn and Horton, 1937, p. 28). This lower level was flooded in 1958. The Whitmore No. 3 shaft is 400 feet southeast of No. 1 shaft. It is a 100-foot inclined shaft sunk on the same vein, but appended by only a few tens of feet of drifts. The third shaft is about 1,700 feet S. 30° E. of No. 1 shaft. It is 280 feet deep, but the extent of the horizonal workings at this shaft was not determined.

Figure 59. General view from north of Randsburg towards the Yellow Aster mine. Glory hole lies beyond large dumps; pale patches are remnants of old mill tailings.

*Yellow Aster (Olympus) Mine.** Location: secs. 2 and 3, T. 30 S., R. 40 E., and secs. 34 and 35, T. 29 S., R. 40 E., M.D.M., on the northwest slope near the crest, of the Rand Mountains. The principal mine adits are half a mile southwest of Randsburg. Ownership: Yellow Aster Mining and Milling Co., 6331 Hollywood Blvd., Los Angeles 28, owns 49 patented claims and 6 unpatented claims; the principal workings are leased to Glenn J. E. Tramill, Clyde Hewitt, and others, Johannesburg (1958).

The Yellow Aster mine (fig. 59), discovered in 1895, and the principal source of gold in Kern County, has an output valued at approximately $12,000,000, which is about one-fourth of the value of the entire gold output of Kern County through 1957. The mine was operated continuously by the Yellow Aster Mining and Milling Company from 1895 to 1918, closed until 1921, then reopened and operated by that company until 1933. The Anglo American Mining Corp., Ltd., leased the mine in 1933 and operated it until 1939. Since that time it has been mined intermittently by lessees who have worked at various places underground and in the walls of a large open pit.

* Compiled largely from descriptions by Hess (1910) and Hulin (1925).

For a few months following its discovery on the Yellow Aster property in 1895, rich gold-bearing placer material was processed in dry washers. Following the depletion of the richer placer material, mining was conducted underground and by 1905 about seven and a half miles of horizontal underground workings had been driven (Aubury, 1904, p. 16). Most of the ore mined from 1905 to 1933 was obtained from a large glory hole, but underground mining was continued and, by 1909, workings totaled between 12 and 15 miles in length (Hess, 1910, p. 39). Part of the old workings were engulfed in the glory hole. About 1938, open pit mining was begun on the walls of the glory hole and continued until the mine was closed in 1939. Since then parts of the mine have been mined at intermittent intervals by lessees. The lessees in 1957 and 1958 were mining on the First level at the east end of what they believed to be the Jake Price vein.

The first ore mined in the Yellow Aster mine was hand sorted and hauled to Garlock, 8 miles to the northwest, and treated in small stamp mills. Later the ore was shipped to custom stamp mills at Barstow. In 1898, a 30-stamp mill with amalgamation plates was built at the mine, and in 1901, a 100-stamp mill was added. In 1916,

the 30-stamp mill was abandoned, and in 1918 a new crushing and screening plant was constructed. Fines were treated in the 100-stamp mill; oversize went to the dumps. This operation continued for only 4 months, and the mine was closed in 1918. The crushing plant was destroyed by fire a few years later.

From 1921, when the mine was reopened, to 1933, only 50 stamps were used. In 1933, Anglo American Mining Corp., Ltd., rebuilt the crushing and screening plant and repaired all the stamps. Because only about 80 percent of the gold was recovered by amalgamation, flotation equipment was installed to treat amalgamation tailings in addition to the ore from the open pit. After 14 months operation the flotation plant was closed and the recovery of gold by amalgamation was resumed. In 1934, a sand and slime cyanide plant was built. In it 1,100 tons of old stamp-mill tailings and current stamp-mill tailings were treated daily. In 1936, the crushing and screening plant was rebuilt to provide a smaller undersize product to the stamp mill.

Between 1895 and May 1939, more than 3,400,000 tons of ore was milled, and about 500,000 ounces of gold was recovered, nearly all by amalgamation. In addition, 1,-700,000 tons of mill tailings was treated and yielded 41,000 ounces of gold (Frolli, 1940, p. 4). From 3,000,000 tons of ore mined through the fall of 1933, about 0.167 ounces of gold per ton remained in the tailings, a recovery of about 80 percent (Cooper, 1936, p. 2). The total value of the gold was more than $12,000,000. Most of the output was mined and sold at pre-1934 prices. Fineness of the gold is about 750.

The Yellow Aster mine is in a fault-bounded wedge containing Mesozoic quartz monzonite, Precambrian? Rand schist, and Tertiary rhyolite dikes. In plan the wedge forms a triangle with the widest angle pointed northeast (fig. 60). The longest side trends N. 60° W. and is about 1,600 feet long. It is formed by the Footwall fault which dips 40° NE. The northwest side is bounded by the Jupiter fault which strikes N. 75° E. and dips 40° NW, (fig. 61) and the northeast side is bounded by the Hanging Wall fault which strikes N. 30° W. and dips 45° NE. The Jupiter and Hanging Wall faults appear to be differently oriented segments of the same fault zone (Hess, 1910, p. 35; Hulin, 1925, p. 122). The long axis of the wedge plunges about 40° NNE., and the apex of the Jupiter and Hanging Wall faults forms an inverted trough.

Mica-albite schist occupies the southeast one-third of the wedge and quartz monzonite the remaining two-thirds. Both rock types contain the gold mineralization, which is largely confined to the rocks within the fault-bounded wedge probably because the rocks within it are so highly fractured and shattered. At many places the rocks are so highly crushed and altered that they cannot be easily distinguished. Gold-bearing veins and zones composed of networks of veinlets trend northwest, terminate at depth against the Footwall fault, and laterally against the other faults. Gold-bearing veins with different orientation are in the footwalls of the Jupiter and Hanging Wall faults and at the crest of the inverted trough formed by them.

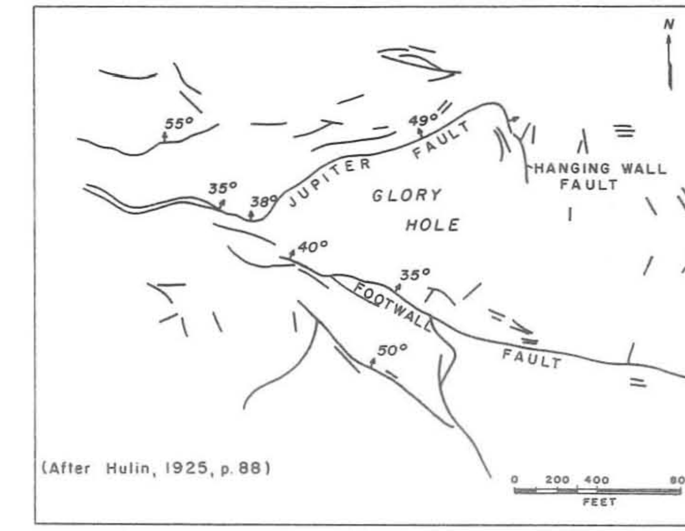
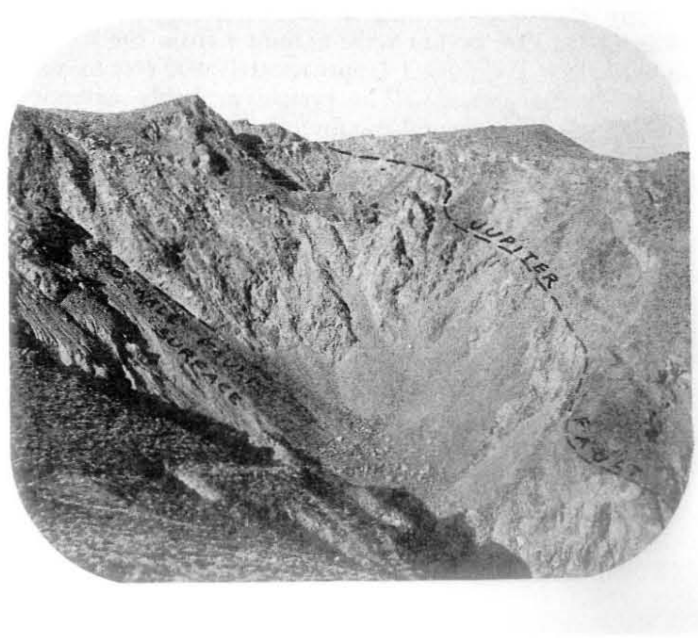


Figure 60. Faults on the surface at the Yellow Aster mine.

The networks of gold-bearing veinlets are in quartz monzonite largely above the First level of the mine and in the western part of the wedge. These veinlets were abundant enough to form ore bodies, most of them in northwest-trending vertical zones. The two largest ore bodies were about 150 feet apart in a zone that cut across the wedge about 500 feet southwest of the apex of the Jupiter and Hanging Wall faults at the floor level of the open pit. The ore bodies in the zone ranged in width from 20 to 95 feet and the zone was about 800 feet long. It extended southeast from the Jupiter fault and pinched

Figure 61. View to west of the western part of the glory hole and open pit at the Yellow Aster mine. Footwall fault forms partly-shaded wall on observer's left; Jupiter fault cuts through right wall. Glory hole in foreground; part of open pit beyond and above.



out at depth at the Footwall fault. The northwest ore body (West set) was 340 feet long, as much as 50 feet wide, and 105 feet in vertical dimension. The southeast ore body (East set) was 265 feet long, as much as 95 feet wide, and was 50 or 60 feet in vertical dimension. The ore bodies consisted of gold-bearing, shattered and porous quartz monzonite. Most of the rock was oxidized and iron stained, but the lower parts of the ore bodies also contained arsenopyrite. The average value of the ore from the East and West sets was probably between \$4 and \$5 per ton in gold at pre-1934 prices (Hess, 1910, p. 35). Most of the rock in this area of the mine was removed during mining in the open pit.

Another system of veins is parallel to the above-noted zone and lies between it and the Jupiter fault. The veins uniformly cross quartz monzonite, schist, and rhyolite, but are narrower and contain less gold in the rhyolite. The veins range in thickness from a fraction of an inch to more than 30 feet, but the average thickness lies between 15 and 20 feet. The principal veins are the Jake Price and the Rand Vertical. Both are along shear zones and both terminate against the Jupiter fault and bottom against the Footwall fault. At the level of the open pit floor the veins are only a few feet apart but 100 feet below they are from 65 to 110 feet apart. They were each about 500 feet long and about 400 feet in vertical extent. The Rand Vertical vein extended about 50 feet above the level of the floor of the open pit and the Jake Price was mostly below that level. Several other veins of this type were in other portions of the wedge, but none was as large. As in the networks of veinlets the larger veins contained free gold disseminated as minute grains in altered and oxidized quartz monzonite or schist. Most veins are considerably iron-stained and contain little or no quartz and relatively small amounts of pyrite or arsenopyrite. Locally sphalerite is associated with the gold. The wall rock of the veins is commonly bleached for several feet on each side of the veins and locally the rock is silicified. Ore containing between \$25 and \$80 per ton in gold was not uncommon in the veins and locally the veins were much richer.

A third system of veins (fault lode veins of Hess) occupy the footwall side of the Jupiter and Hanging Wall faults. Ore bodies were common from the surface to below the Third level (approximately 800 feet in maximum vertical extent). The system probably extended laterally also for several hundred feet. They were especially common in the inverted trough at the intersection of the Jupiter and Hanging Wall faults. The veins are similar to the other veins except that locally particles of gold as large as wheat grains were found and the vein material is composed of more finely ground rock. Ore bodies were measurable in tens of feet, one being 100 feet long, 50 feet wide, and probably 40 feet high. It is thought to have averaged \$10 per ton in gold (Hess, 1910, p. 36). Others were from 20 to 500 feet long, 4 to 16 feet thick, and most of them tapered down dip. Hess (1910, p. 35) states that in this system "below the Third level the quantity of crushed material along the fault decreases considerably, iron and arsenic pyrites appear, and gold values decrease." Some of the richest ore bodies were at intersections of this system with the other gold-bearing systems.

Ore that was mined from the glory hole, and later from the open pit contained barren rock as well as the gold-bearing veins. After extensive testing by mill runs, certain sections of the mine above and below the floor of the glory hole were estimated (Frolli, 1940, p. 8) to contain several million tons of rock with an average of about 0.020 of an ounce of gold per ton, but screened fines from this rock contained as much as 0.061 of an ounce of gold per ton. Part of this tonnage was subsequently mined.

The mine contains four principal levels and at least ten less extensive levels (pl. 10). The Rand level, 3,980 feet in elevation and about 500 feet below the crest of the mountain, is now the floor of the open pit. It was the principal haulage level. Beneath it are the First, Second, and Third levels at approximately 100-foot intervals. These four levels contain about three-fifths of the underground workings. Most of the other levels were above the Rand level, but intermediate levels were driven between the Rand and First levels and an inextensive Fourth level was driven below the Third level. The workings beneath the Rand level join to the surface by means of three shafts with collars at the elevation of the floor of the open pit. The Main shaft, inclined 45° NE., extends 250 feet to the Second level; the Hercules shaft, inclined 40° NE., extends 450 feet to the Fourth level; and the Rand shaft extends vertically to a depth of 450 feet. The Main shaft collar is in the floor of the open pit approximately midway between the East and West sets. The Rand shaft collar is 400 feet northeast of the Main shaft and the Hercules shaft collar is about 200 feet farther north-northeast. The maximum plan dimensions of the glory hole were about 150 by 300 feet at the bottom (105 feet above the Rand level) and 700 by 900 feet at the rim. The floor and rim of the open pit are larger than the glory hole, and many of the older underground workings above the Rand level open into the walls of the open pit. Wall heights range from 100 to 400 feet; the rim of the open pit is 1,250 feet long and 800 feet wide. The footwall fault forms the southwest wall of the open pit and the Jupiter fault crops out high in the northwest wall.

Yellow Dog Mine. Location: NW¼NW¼ sec. 32, T. 11 N., R. 12 W., S.B.M., Mojave district, 3 miles southwest of Mojave on the east side of a small hill a few hundred yards west of Standard Hill. Ownership: Yellow Dog Mining Co., Bert Wegman, president, P.O. Box 195, Randsburg, owns two patented and six unpatented claims (1958).

Although the Yellow Dog vein was discovered about 1902, initial development by surface cuts and shallow shafts failed to disclose mineable ore bodies. These early shafts were sunk on a calcite vein 4 to 6 feet wide, but the hanging-wall part of the vein was not explored be-

cause it was not recognized as part of the vein. In 1922 Percy Wegman discovered a quartz vein containing high-grade ore in this heretofore unrecognized part of the vein. After the mine was purchased in 1922 and the Yellow Dog Mining Co. was formed, the mine was operated until the early 1930s. During the last few of these years mining was by lessees, and little mining has been done since. The most recent recorded shipments were made in 1950 and 1951, when Louis Meehl of Mojave shipped 21 tons. Total recorded production from the mine exceeds 4,500 tons of ore which contained an average of 1.3 ounces of gold and 8 ounces of silver per ton.

Mineralization is along a vein 4 to 10 feet wide which strikes N. 20° W. and dips 60° NE. The vein crops out about 1,000 feet along a contact between Tertiary quartz-latite porphyry on the footwall side and Mesozoic quartz monzonite on the hanging-wall side. The footwall part of the vein is composed mostly of manganese dioxide and iron-stained coarsely crystalline calcite. Most of the footwall part is barren of gold and silver except in minor veinlets and lenses of mineralized quartz in the calcite. This part of the vein averaged less than 0.1 ounce of gold per ton (Newman, 1923, p. 307). The hanging-wall part is composed principally of quartz and it contains most of the ore minerals. The minerals include coarse to fine particles of free gold and cerargyrite with minor amounts of pyrite, arsenopyrite, and other metal sulfides. The ratio of gold to silver recovered was about 4:3. The largest ore shoot was 200 feet long and was mined to the surface from a point a few tens of feet northwest of the northernmost shaft. An extension of this ore shoot raked steeply northwest and extended a few feet below the 300 level.

The Yellow Dog mine was developed by two principal shafts 420 feet apart. The deepest shaft is at the base of the southeastern part of the hill and is 336 feet deep on a 60° incline to the northeast. Levels were driven at approximately 100-foot intervals. Horizontal workings from this shaft total over 2,000 feet in length and are mostly drifts extended northwest from the shaft. On the 300 level a crosscut was driven 300 feet west into the footwall from a point 120 feet northwest of the shaft, but no veins were encountered. In the valley floor 420 feet southeast of the deep shaft, the Cook shaft was sunk at an angle of 55° to an inclined depth of 240 feet. It has levels at 50, 100, 150, 180, and 240 feet which aggregate about 500 feet in length of horizontal workings. A few other shafts have been sunk both north and south of the main shaft, the deepest of which is 60 feet.

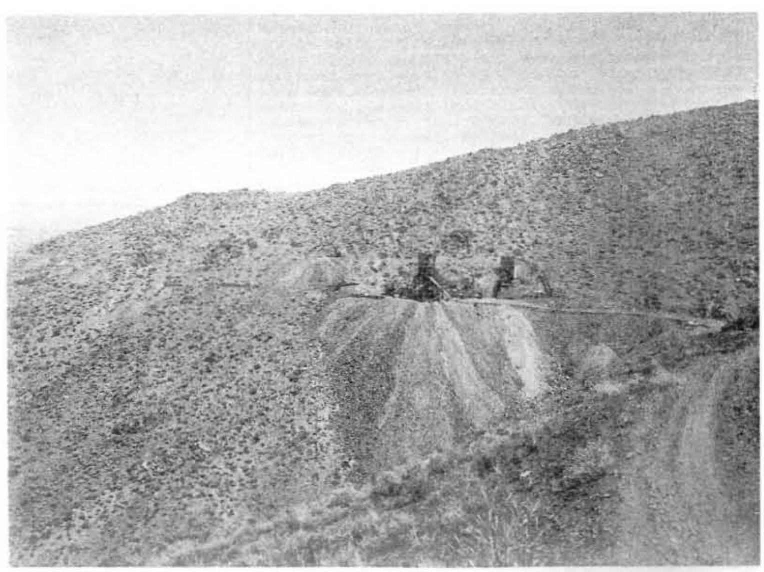
Zenda Mine. Location: SW¼ sec. 29, T. 31 S., R. 33 E., M.D.M., Loraine district, 2 miles southwest of Loraine on a high ridge between Studhorse and Big Last Chance Canyons. Ownership: Zenda Gold Mining Company, 120 Broadway, New York, N.Y. (1933).

The oldest published records indicate that the Zenda vein was known as early as 1904 (Aubury, 1904, p. 16). Available production records, however, suggest that the first ore was mined in 1909 when the Zenda Mining and Milling Company mined 200 tons of ore and milled it in a 10-stamp mill erected on the property. Relatively small amounts of ore were mined at intermittent intervals from 1910 until 1922 when the mine was purchased by the Zenda Gold Mining Company. This company installed a 150-ton ball mill and cyanide plant (Tucker, 1924, p. 41) and during the subsequent 4-year period mined over 90 percent of the mine's total recorded output. Little mining has been done at the Zenda mine since 1928. From 1909 to 1958 a total of about 54,000 tons of ore was mined which contained an average of 0.6 ounces of gold and 2 ounces of silver per ton.

A Tertiary rhyolite porphyry dike intrusive into Mesozoic quartz diorite underlies most of the mine area. Silver and gold were found along a shear zone 30 to 50 feet wide, which strikes about N. 30° E. and dips 40° NW. At the surface, quartz diorite forms the footwall and rhyolite porphyry forms the hanging wall. The vein consists mostly of quartz and silicified gouge which contain unidentified oxidized silver minerals and free gold. The principal ore body at the Zenda mine was 300 feet long and 30 to 50 feet wide.

Most of the ore was mined from a glory-hole, the bottom of which is connected by an extraction raise with a long crosscut adit driven N. 30° W. from the mill site level. The mill site is 550 below the outcrop of the vein. The length of the crosscut was not determined, but the extraction raise was driven from it at a point 350 feet from the portal of the crosscut adit. Several hundred feet of additional workings were driven on the vein on levels above the crosscut adit (Tucker, 1924, p. 42). Most of the workings were badly caved in late 1958.

Figure 62. View to northeast of the New Deal mine. Vein dips away from observer and crops out from left of photo to bend in road at right.



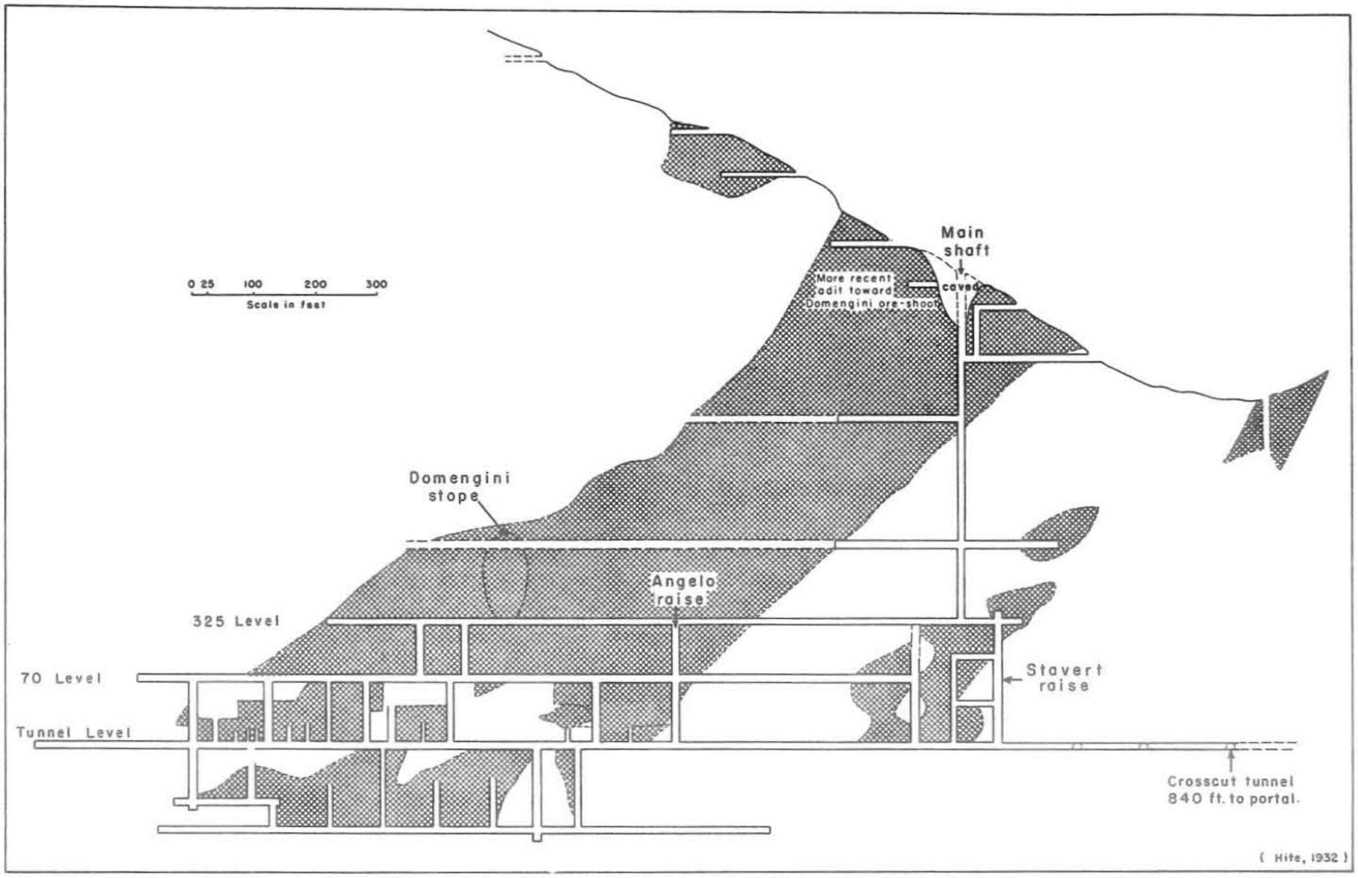


Figure 63. Longitudinal projection of the Keyes mine.

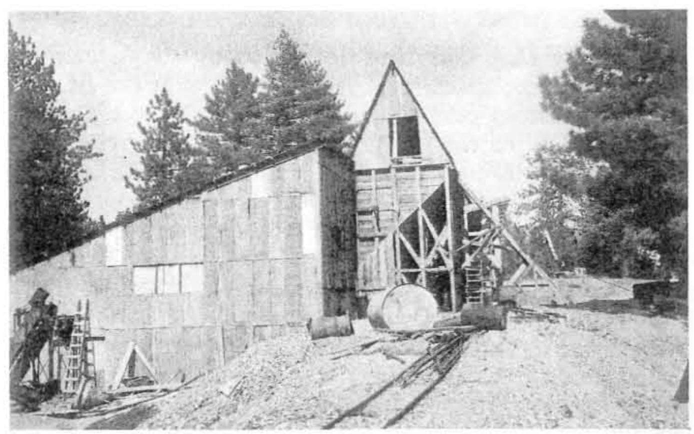
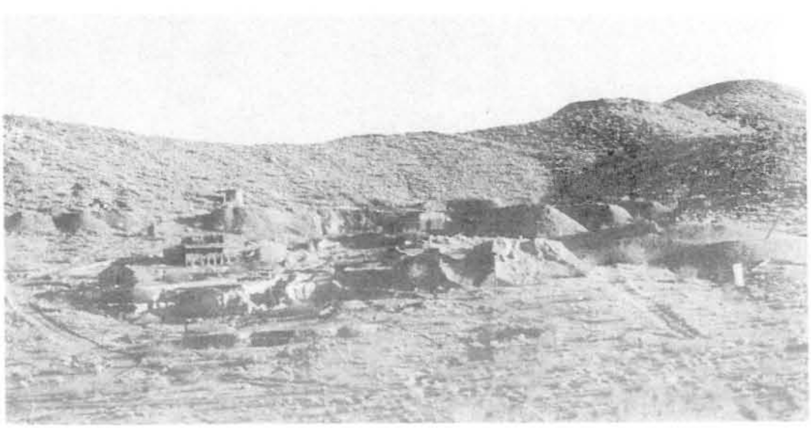


Figure 64. View to east of the Lone Star mill and head frame of mine, Piute Mountains. This former gold mill was modified for tungsten ore in the mid-1950s.

Figure 65 (below). View to north of the Operator Divide mine. Gold ore is mined each summer from inclined shaft in saddle between the two highest peaks in upper right of photo.



GOLD

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Accident claim				Former claim of Standard Group. (Aubury 04:8t; Brown 16:486; Tucker 23:160; Tucker, Sampson 33:272t)
	Ajax claim				Former claim of Wegman group. (Aubury 04:8t; Tucker 23:161; 29:37; Tucker, Sampson 33:272t, 311; 40:34, 35).
	Aladdin	Reported in sec. 32, T11N, R12W, SBM, Mojave dist., (1904); not confirmed, 1958	Undetermined, 1958; W. J. Nelson, Los Angeles (1904)	Four-foot vein strikes NE., dips vertically; in granite and porphyry.	Uncorrelated old name. Probably listed herein under another name. (Aubury 04: 8t).
107	Allstate prospect	SE¼SE¼ sec. 4, T30S, R40E, MDM,; Rand dist., 2½ miles southwest of Randsburg, on northwest side of Rand Mts.	D. P. Shorey, W. T. Johnson, Randsburg (1957)	Poorly-exposed iron-oxide-stained shear zones in schist. Zone with most exploratory work strikes N. 30° W., dips 60° E., is from 2 to 4 feet wide, and is few tens of feet long.	Two claims. Formerly Raven and No. 1, owned by T. B. Peterson. Developed by several prospect shafts and adits. Probably small output. Idle.
	Alpha	Reported in sec. 36, T26S, R32E, MDM, (1904); not confirmed, 1957	Undetermined, 1957		Uncorrelated old name; probably long abandoned prospect (Aubury 04:8t).
	Amalie mine				See text under silver.
	America (American) group	Reported in sec. 26 T29S, R40E, MDM, Rand dist., 1 mile north of Randsburg (1910); not confirmed, 1957	Undetermined, 1957; C. E. and J. Jeffords, Randsburg (1910)	Gold in mineralized fault in schist. Fault strikes N. 20 - 30° W., dips 40° NE.	Formerly 3 claims - Blue Bird, Yellow Jacket, and U. S. Ore shoots near the surface yielded a few thousand dollars in gold by 1910. (Hess, 1910, p. 40). Probably part of the Snowbird claims, which see. (Aubury 04:08t; Hess 10:40).
	American Mining Co. property				See Pine Tree mine (Aubury 04:08t, 17t; Brown 16:506).
	Amethiste	Reported in sec. 4, T10N, R14W, SBM, Mojave dist., on southeast flank of Tehachapi Mts. (1950); not confirmed, 1958	Undetermined, 1958; George F. Engel Cantil (1950)		Uncorrelated name. Produced 150-175 tons between 1935-1950 which contained an average of about .5 oz. gold per ton.
108	Amy (Gold State) mine	NE¼ sec. 5, T29S, R34E, MDM, Piute Mts. area, 3/4 mile northwest of Claraville	Peter F. Errecart and Anna Hagenston, P.O. Box 10B, Tehachapi City own 5 unpatented claims (1958)	Several parallel gold-bearing quartz veins, two inches to as much as three feet wide, strike N. 70°-80° E., dip 65°-70° SE.; in sheeted zones in deeply weathered Mesozoic granodiorite. Apparently rich ore occurred in kidney-like masses.	Developed prior to 1916 by 80-foot shaft, 200 feet of drifts; also one stope, 80 feet long. High-grade ore treated in steam-powered arrastre yielded $20,000 prior to 1916 (Brown, 1916) or $75,000 prior to 1898 (Tucker and Sampson, 1933). Intermittent small scale operation since 1900, with $8,900 recovered in 1931 from 157 tons of ore. By 1933 workings included three adits; one reported (Tucker, 1933 p. 287) to be 655 feet long, with a 70-foot winze 540 feet from the portal in which is exposed a 30-inch vein carrying $60 per ton in gold. From this level a stope 120 feet long was dug 80 feet to the surface. Other adits include an upper 150-foot crosscut driven from the south side of the ridge to meet a raise driven from a point 470 feet from the portal, and, 80 feet below, a crosscut 300 feet long in 1933, driven westerly to intersect the ore shoot mined. By 1955, all workings were at least partially caved near the collar, some were flooded. All track and machinery removed; long idle. (Brown 16:496; Eric 48:254t; Tucker, Sampson 33:272t 287; Tucker, Sampson, Oakeshott 49:210, 253t).
	Anaconda	Reported in sec. 32, T11N, R12W, SBM (1904); not confirmed, 1958	Undetermined, 1958; C. C. Calkins and L. E. Potter, Mojave (1904)	Five 3-foot veins, strike east, dip north in porphyry and granitic rock.	Uncorrelated old name. May have been claim in Four Star Group. (Aubury 04: 8t).
	Ana-Isabell mine				See High Grade group. (Tucker, Sampson 33:322-323).
	Anatrosa	Reported in SW¼ sec. 13, T30S, R32E, MDM, Loraine dist. on Caliente Cr. about 4 miles west of Loraine (1916); not confirmed, 1958	Undetermined, 1958; ___Blodgett, Bakersfield (1916)	Thirty-foot vein strikes NW., dips 50° SW.; in granitic rock and schist.	Uncorrelated old name. Described as being west of Golden group (Ferris ?) whose location is also indefinite. May be listed herein under another name. No know production. (Brown 16:486).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
109	Angus property	NE¼ sec. 3, T29S, R38E, MDM, El Paso Mts., on west side of Bonanza Gulch, 10 3/4 miles north-northeast of Cantil	Norman Angus, 2748 Gale Ave., Long Beach (1958)	Gold-bearing Quaternary terrace and stream gravels which overlie sedimentary rocks of the Goler formation (Paleocene). Gold occurs as flakes and nuggets in lower part of terrace gravels which cap low mesas on edge of Bonanza Gulch. Gravels are from few feet to more than 20 feet thick. Gold also occurs in more recent gravels in gullies down slope from terrace deposits.	Name of claim undetermined. Developed by many short adits driven into lower part of terrace gravels from sides of Bonanza Gulch. Probably the source of a moderate amount of gold recovered by small-scale dry washing methods in 1890's and 1930's. Intermittently worked by small-scale methods in recent years.
	Ann	Reported in sec. 11, T9N, R13W, SBM, Mojave dist., 4 miles northwest of Rosamond.	Undetermined, 1958; E. M. Hamilton Rosamond (1904)	One- to 4-foot quartz vein in decomposed granite.	Uncorrelated old name. Probably now part of Tropico mine. (Aubury 04:8t).
	Annex	Reported in sec. 12, T29S, R39E, MDM, El Paso Mts., (1904); not confirmed, 1958	Undetermined, 1958; I. D. Short, Randsburg (1904)	Undetermined.	Uncorrelated old name. Probably a lode prospect listed herein under different name. (Aubury 04:8t).
	Annex	Sec. 4, T30S, R40W, MDM, Rand dist., 2 miles west of Randsburg (1904); not confirmed, 1957	Undetermined, 1957; Montgomery and Maginnis, Randsburg (1904)	Quartz vein, 18 inches to 6 feet wide, strikes NE., dips SE.; in schist.	Uncorrelated old name; may be property listed herein under different name. Inclined shaft 186 feet deep and 500 feet of drifts. Only production recorded in 1899. (Aubury 04:8t).
	Antique, Extension claim				Claim of Whitmore mine (Tucker 23:162).
	Antrim claim				Patented claim of Long Tom mine. (Tucker, Sampson 33:316).
	Apache prospect				See under copper.
110	Apple Green prospect	NE¼ sec. 30, T28S, R40E, MDM, El Paso dist., 8 miles northwest of Randsburg, east slope of El Paso Peaks	J. E. Hicks, H. H. Hicks, Mojave (1957)	Quartz-enriched shear zones in quartz monzonite.	Six claims. Prospected by discovery holes and an old 100-foot vertical shaft. No production; idle.
	Arcadia	Reported in sec. 36, T26S, R32E, MDM, (1904); not confirmed, 1957	Undetermined, 1957		Uncorrelated old name; probably long abandoned prospect (Aubury 04:8t).
111	Arizona mine	NW. corner sec. 17, T30S, R40E, MDM, Rand dist., 4½ miles southwest of Randsburg, on northwest slope of Rand Mts.	Undetermined, 1957	Free gold in quartz-bearing fault zone in iron-stained schist. Fault strikes N. 80° E., dips 55°S., and is exposed on north side of small spur of Rand Mts. for a few tens of feet. Ore shoots are only few inches wide, but have yielded rich ore in places.	Two inclined shafts of undetermined depth about 40 feet apart are connected by near surface stope. In 1916, one shaft was 60 feet deep and 20 tons of ore from it contained $1,520 in gold (Brown, 1916, p. 487). Several tens of ounces of gold were produced 1918-1921 from ore that contained from 1 oz. to 4 oz. gold per ton. Property now included in Sidewinder group, which see. (Brown 16:487).
	Ashford Mines	Rand district			Early name for what is mainly the King Solomon mine, which see. (Aubury 04:8t, 10t, 11t, 12t, 13t; Crawford 96:186, 188, 189, 191, 193, 195, 197).
112	Atlas mine	W½ sec. 14, T31S, R33E, MDM, Loraine district, about 2 miles southwest of Nellie's Nipple in Tollgate Cyn.	George Ramey, Caliente (1958)	Quartz vein, 3 to 5 foot-wide strikes N. 40° W., dips 45° SW. Wall rock is strongly foliated mafic granitic rock.	Developed by 75-foot inclined shaft with several hundred feet of workings on a level at the bottom.
	Austrian Eagle claim				Part of Glen Olive mine (Aubury 04:8t).
	Badger	Reported in sec. 17, T28S, R40E, MDM, El Paso Mts. (1904); not confirmed, 1957	Undetermined, 1957; Mr. Johnson, San Francisco (1904)	Quartz vein in granite.	Uncorrelated old name; may be property listed herein under different name. Inclined shaft 204 feet deep. (Aubury 04:8t).
	Bald Eagle	Reported 3 miles northeast of Havilah (1896); not confirmed, 1957	Undetermined, 1958; Dan Doherty, Havilah (1896)		Uncorrelated old name; probably long abandoned prospect. (Crawford 94:141; 96:186).
	Bald Eagle Claim				Patented claim of the Yellow Aster mine. (Aubury 04:8t).
	Bald Eagle No. 1 mine	Reported in Goler dist., El Paso Mts. (1896); not confirmed, 1958	Undetermined, 1958; Frank Nugent, Mojave (1896)	Placer gold in gravel.	Worked by dry placer methods in 1890's with low daily yield of gold. Probably listed herein under different name. (Crawford 96:186, 190t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Bald Eagle No. 2	Reported in Goler dist., El Paso Mts. (1896); not confirmed, 1958	Undetermined, 1958; Robert Witcher, Randsburg (1896)	Placer gold in gravel.	Worked by dry placer methods in 1890's with low daily yield of gold. Probably listed herein under different name. (Crawford 96; 186, 190t).
113	Baltic mine	SE¼ sec. 1, T30S, R40E, MDM, Stringer dist., 1½ miles southeast of Randsburg	E. D. and Vivian Horkheimer, addresses undetermined (1958)	Many small quartz veins in Rand schist. Also tungsten lode and placer deposits.	See text (Aubury (04:8t, 17t; Brown 16:487; Hess 10:40, 41; Hulin 25:72, 84, 93, 128; Newman 23:30; 23b:105; Tucker 29:25; Tucker, Sampson 33:272t; 287-288; Tucker, Sampson, Oakeshott 49:253t).
	Banner	Sec. 33, T29S, R40E, MDM, Rand dist., 1½ miles west of Randsburg (1904); not confirmed, 1957	Undetermined, 1957; J. L. Price, Randsburg (1904)	Quartz veins in schist.	Uncorrelated old name; may be property listed herein under different name. Developed by 25-foot shaft, 25-foot incline shaft, and 50-foot incline shaft, 100 feet open cuts, 500-foot tunnel (crosscut?) and 50 feet of drifts. (Aubury 04:8t).
114	Barbarossa mine	NE¼ sec. 16, T30S, R33E, MDM, Loraine dist., on north-trending ridge between Sand Cyn. and Sycamore Cr. one mile north of Loraine	Chris F. Rosenhoffer, 277 Douglas St., Pasadena (1958)	Two- to 6 foot-wide quartz vein strikes N. 35° W., dips 50°-70° NE.; in rhyolite porphyry dike.	See text. (Brown 16:487; Tucker 29:25; Tucker, Sampson 33:272t, 288; Tucker, Sampson, Oakeshott 49:253t).
115	Barnett group	SW¼ sec. 16, T30S, R40E, MDM, Rand dist., 4 miles southwest of Randsburg, Rand Mts.	Floyd H. Barnett and assoc., 5564 N. Walnut Grove Ave San Gabriel (1957)	Free gold in silicified schist in shear zones which strike about N. 60° W. and dip 50° SW.	Several claims and privately owned land. Developed by several open cuts, trenches, shallow shafts, and short adits. Total output undetermined but probably small. Active in 1930's and 1940's. Long idle. (Tucker, Sampson 33:272t, 288; Tucker, Sampson, Oakeshott 49:253t).
	Barron mine				See Rademacher mine. (Aubury 04:8t).
	Barton	Reported in Piute Mts., 9 miles northeast of Piute (1896); not confirmed, 1958	Undetermined, 1958; S. Barton, Claraville (1896)		Uncorrelated old name. Probably long abandoned prospect. (Crawford 96:186).
	Bear Track Flat	Reported in T27S, R32E, MDM (1896); not confirmed, 1957	Undetermined, 1957; J. B. Calland, Woody (1896)	Auriferous gravel 3 feet in average thickness.	Uncorrelated old name. Probably abandoned. (Crawford 96:186).
116	Beauregard claim	NE¼ sec. 28, T25S, R33N, MDM, Cove dist., 2 miles southwest of (new) Kernville, west side of Lake Isabella	Kern Development Co., C. S. Long, pres., Box 157, Hayward. Leased to Kern Mines Inc., Roland Toggnazzini, pres., 260 California St., San Francisco (1955)	Quartz vein strikes N. 75° E., dips 85° NW. in Mesozoic granodiorite.	See Big Blue group in text. (Aubury 04: 8t; Brown 16:487-488; Crawford 94:142; Goodyear 88:321; Newman 22:146-147; Prout 40:389, 393, 416, 417, 419; Tucker 24:35, 36-40; 29:27, 42, 43; Tucker, Sampson 33:272t, 280, 289, 320-321; 40:28; 40:323; Tucker, Sampson, Oakeshott 49:253t).
117	Beauregard Extension claim	N½ sec. 28, T25S, R33E, MDM, Cove dist., 2 miles southwest of (new) Kernville, west side of Lake Isabella	Dickson A. Boyd, Box 77, Kernville (1955)	Two or more quartz veins, 2 to 4 feet wide, strike N. 50° E., dip 75°-80°SE.; in Mesozoic granodiorite and alaskite. Ore is free-milling, with some sulfides. Oreshoot reported 80 to 160 feet long.	Relatively recent claim, though pre-1940 at least, adjacent to Big Blue workings on old San Francisco Belle claim (Tucker 1924, p. 34). Developed by 300-foot inclined shaft with levels at 80, 160, 200, and 240-foot depths. From shaft, drifts are 100 feet NE. on 80-foot level, 100 feet NE. on 160-foot level, 50 feet SE. on 200-foot level, 160 feet SW. and 190 feet NE., on 240-foot level. Fire in 1953 destroyed buildings, caused caving underground; necessitated new shaft 50 feet deep in 1955. No record of production; intermittently active. (Tucker, Sampson 40b: 324; Tucker, Sampson, Oakeshott 49:210, 254t).
118	Beck property	Approximate center of sec. 27, T29S, R40E, MDM, Rand dist., 1½ miles northwest of Randsburg	Harold E. Beck, P.O. Box 353, Randsburg (1957)	Moderately fine gold in alluvium derived from Rand Mts.	Mined mostly from gold-bearing channels exposed in trenches and shallow pits. Production undetermined; probably small. Part time recovery of gold by concentration with dry placer equipment.
	Beehive				Uncorrelated old name; may be in vicinity of Hoover mine, which see under silver. (Hulin 25:128; Tucker 29:25-27, 57; Tucker, Sampson 33:272t, 288-289; Tucker, Sampson, Oakeshott 49:254t).
	Bell claim				Patented claim of Long Tom mine. (Tucker, Sampson 33:316).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
119	Bella Rufin (Ruffin, Berry) mine	Sec. 35, T29S, R33E, MDM, Loraine dist., about 4 miles northeast of Loraine, west side of Sand Cyn.	Undetermined, 1958; Tom Davies, Caliente (1939)	Vertical vein, 4 feet wide, strikes northwest; in granitic rock; ore occurs in pockets.	Developed by 120-foot shaft, a few short drifts, and one stope. Production in 1897, 1900, and 1939 totals between 50 and 75 ounces of gold. Idle. (Aubury 04:8t; Brown 16:488; Crawford 94:142; 96:186; Goodyear 88:320; Tucker 29:27; Tucker, Sampson 33:272t, 289; Watts 93:238).
120	Bellflower (Huntington) mine	NW¼ sec. 29, T27S, R40E, MDM; Rademacher dist., 4½ miles southwest of Ridgecrest	Shafter Bros. Co., P.O. Box 1048, Trona (1957)	Iron-stained and cavernous quartz vein, in quartz monzonite, strikes N. 70° E., dips 70° SE. Contains free gold, iron sulfides, and minor amounts of copper oxides as green stains. Vein ranges in width from few inches to 4 feet and is at least 200 feet long. Largest ore shoots are at an intersection of quartz vein and diorite dike (Tucker and Sampson, 1933, p. 310).	Three unpatented claims. Developed by drift adit extended northeast along the vein for 200 feet and a 100-foot shaft at portal of drift adit. A mill was being constructed at the mine in 1957. Probably first developed in early 1900's. Production undetermined. (Tucker, Sampson 33:274t, 309-310; Tucker, Sampson, Oakeshott 49:260t).
121	Belmont prospect	NW¼ sec. 1, T30S, R40E, MDM, Rand dist. 3/4 miles southeast of Randsburg	Undetermined, 1957; A. E. Graham, Whittier (1933)	Quartz veins in quartz monzonite.	Long idle prospect. (Tucker, Sampson 33:272t).
	Ben Hur claim				Former claim name of Silver Queen. See Sailor Boy (Tucker, Sampson 33:276t, 326).
	Bernstine	Reported in sec. 12, T29S, R39E, MDM, Goler dist., El Paso Mts. (1940); not confirmed, 1958	Undetermined, 1958	Placer gold in alluvium.	Uncorrelated old name. Probably listed herein under different name (Aubury 04:18t).
	Berry mine				See Bella Rufin (Crawford 94:142; 96:186; Goodyear 88:320).
	Beryl group				See under uranium (Tucker 29:35; Tucker, Sampson, Oakeshott 49:210-211, 254t).
122	Big Blue (includes: Beauregard, Big Blue, Big Blue-Sumner, Blue Gouge, Bull Run, Content, Frank, Jeff Davis, North Ext. Sumner, Red Hill, Sumner, Urbana, and others) group	Most of sec. 28, NW¼ sec. 33, E½ sec. 21, T25S, R33E, MDM, Cove dist., 2 miles south of (new) Kernville, west side of Lake Isabella	Kern Development Co., C. S. Long, pres., Box 157, Hayward. Leased to Kern Mines, Inc. Roland Toggnazzini, pres. 260 California St., San Francisco (1955)	Gold-bearing quartz veins in northeast-trending shear zone in Mesozoic alaskite and granodiorite.	See text. (Aubury 04:8t, 17t; Brown 16:488-489; Crawford 94:142, 146; 96:186; Eric 48:254t; Goodyear 88:315; Jenkins 42:326t; Prout 40:379-421; Tucker 24:35, 36, 40; 29:27-28; 42-43; Tucker, Sampson 33:272t: 278, 280, 289-291, 320-321; 34:313, 314; 40:11, 28; 40b:323, 324, 329; Tucker, Sampson, Oakeshott 49:211-212, 254t).
	Big Butte mine				See Butte mine. (Tucker, Sampson 33:272t, 291; 40:11, 29).
	Big Bonanza	Reported in sec. 16, T29S, R39E, MDM, vic. Garlock (1933); not confirmed, 1958	Undetermined, 1958; J. E. McGinnes, Randsburg (1933)	Quartz vein containing copper sulfides in porphyritic rock.	Uncorrelated old name; may be property listed herein under different name. (Aubury 04:8t; Tucker, Sampson 33:272t).
	Big Bonanza	Reported five miles north of Caliente on Basin Cr., Sierra Nevada (1896); not confirmed, 1958	Undetermined, 1958; J. B. Ferris, Caliente (1896)	Gold-bearing zone of crushed material along fault in granite.	Last reported 1896. (Crawford 96:186-187).
123	Big Dike (Big Dyke) mine	NW¼NW¼ sec. 1, T30S, R40E, MDM, Rand dist., half a mile south of east end of Randsburg, west side of paved road in Fiddlers Gulch	J. D. O'Shea estate, Benko brothers, Portage, Pennsylvania, and Mrs. M. O. Miller, Los Angeles (1958)	Gold-bearing siliceous shear zone in quartz monzonite.	See text. (Tucker, Sampson 33:272t, 292; 40:11, 29; Tucker, Sampson, Oakeshott 49: 212-213, 254t).
	Big Dyke mine				See Big Dike mine.
124	Big Four claim	SW¼ sec. 34, T28S, R38E, MDM, El Paso Mts., west side of Bonanza Gulch, 11 miles north-northeast of Cantil	Walls (?) brothers and others, Los Angeles (1958)	Gold-bearing Quaternary gravels in terrace deposits and in stream gravels derived from them. Source of gold is probably auriferous sedimentary rocks of the Goler and Ricardo formations which crop out in a large part of the El Paso Mts. Both of the formations underlie the gravels on this property. Richest deposits appear to be near the base of the Quaternary gravels which form a mesa on the west side of Bonanza Gulch. The mesa gravels are from a few feet to more than 20 feet thick.	This property was camp site (Bonanza Gulch camp) and part of the source of gold mined in the 1930's by a group who acquired several claims and tested a large area for gold. Name of group and production undetermined. Probably some production also in 1890's. Operated mostly by small-scale dry washing of gravels mined from small workings along base of gravels. (Walter Bickel, personal communication, 1958).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
125	Big Gold (Big Tungsten, Bi-metallic, West End) mine	Center W½ sec. 3, T30S, R40E, MDM, Rand dist., one and a half miles southwest of Randsburg, on northwest flank of Government Pk.	John Kreta, P.O. Box 251, Randsburg (1958)	Gold-bearing fault zone in quartz monzonite and schist. Also tungsten and traces of copper.	See text (Hulin 25:84, 130; Jenkins 42: 330t; Tucker 23:166; 29:28; Tucker, Sampson 33:272t, 291-292; Tucker, Sampson, Oakeshott 49:213, 254t, 272t).
	Big Horse claim				Patented claim of the Yellow Aster mine. (Crawford 96:187, 194; Hess 10:40).
	Big Indian	Reported in secs. 5, 6, 7, T28S, R34E, MDM (1904), Piute Mts.; not confirmed, 1957	Undetermined, 1957		Uncorrelated old name; may be listed herein under different name (Aubury 04: 8t).
	Big Three (Big Tree) mine	Secs. 10, 11, 14, 15, T9N, R13W, SBM, Mojave district, 4½ miles northwest of Rosamond	Undetermined, 1958; V. V. Cochran; Barmore Gross, Rosamond (1904)	Six 2- to 4-foot-wide veins strike northeast, dip 75° SE.; in porphyritic rock.	Old name; now part of Tropico group. (See text) (Aubury 04:8t).
	Big Tree mine				See Big Three and Tropico group (Brown 16:512).
	Black and Sullivan mine	Reported in Red Rock dist. (1896) not confirmed, 1958	Undetermined, 1958	Placer gold in alluvium.	Uncorrelated old name. Probably long abandoned claim. Worked by dry placer methods in 1890's; about 470 oz. of gold recovered. (Crawford 96:187, 195t).
126	Black Bob mine	Reported in SW¼ sec. 10, T9N, R20W, SBM, about 2 miles north of Tecuya Mt. 4 miles northwest of Frazier Park; not confirmed, 1958	Undetermined, 1958; George L. Harris, 2636 Sunset Ave., Bakersfield (1934)	Gold-bearing quartz vein 2 feet wide strikes NE. and dips SE.; in granitic rock. Ore mined 1932-1934 contained some lead.	Developed by 150-foot vertical shaft, 100-foot adit, few hundred feet of drifts. About 800 tons ore produced 1932-1934. Idle since. (Aubury 04:8t; Goodwin 57:526t).
	Black Mountain	Reported in sec. 10, T29S, R38E, (also 39) MDM, on south slope of Black Mt. (1929); not confirmed, 1958	Undetermined, 1958; Charles Brewer, Los Angeles (1929)	Gravel containing from 50¢ to $2 per cubic yard in gold (Tucker, 1929, p. 29). Gold reported to occur about 3 feet above sandstone bedrock. Also reported as lode mine by Eric (1948) and Goodwin (1957) with lead, copper, and silver, associated with gold.	Uncorrelated old name. Probably in sec. 2, 3, or 4. May be listed herein under different name. (Dibblee 52:60t; Eric 48:254t; Goodwin 57:527t; Tucker 29:29; Tucker Sampson 33:272t; Tucker, Sampson, Oakeshott 49:254t).
	Black Point Copper	Reported in sec. 18, T28S, R39E, MDM, El Paso dist. (1904); not confirmed, 1957	Undetermined, 1957; P. Sartiat, Kern City (1904)	Quartz vein with sulfides in metamorphic rocks.	Uncorrelated old name; may be property listed herein under different name. A 130-foot shaft, 60 feet of open cuts, and 80 feet of drifts. (Aubury 04:8t).
	Black Tiger claim				Claim in Standard group (Tucker 23:160).
	Blue Bell mine				See Ruby mine. (Tucker, Sampson 33:324).
127	Blue Chief (Turbo) mine	SW¼ sec. 11, T26S, R31E, MDM, near the head of Lumreau Cr. 7 miles southeast of Glennville	Undetermined, 1957; Blue Chief Mining Co., San Francisco (1935)	Very weak quartz stringer in granodiorite strikes N. 22° W.; nearly vertical. Vein contains lead, silver, and copper minerals in addition to gold.	Workings consist of two shafts, and a tunnel trending S. 22°E., all of which are caved. Dump material indicates at least a few hundred feet of workings. Several hundred tons were milled in a 5-stamp mill on the property. Ten to twenty tons of silver-gold concentrates were shipped in 1934-35 which contained recoverable lead and copper. Silver-gold ratio was 77 to 1. (Goodwin 57: 227t; Eric 48:254t).
	Blue Eagle mine				See Cactus Queen mine in text (Julihn, Horton 37:34, Tucker, Sampson 35:467-472; Tucker, Sampson, Oakeshott 49:254t).
	Blue Gouge (No. 2, No. 3) mine	SE¼ sec. 28, T25S, R33E, MDM, Cove dist., 2½ miles southwest of (new) Kernville, west side Lake Isabella	Kern Development Co., C.S. Long, pres., Box 157, Hayward. Leased to Kern Mines, Inc. Roland Toggnazzini, pres., 260 California St., San Francisco (1955)	Quartz veins in Mesozoic alaskite and Paleozoic (?) metamorphic rocks.	See Big Blue group in text. (Brown 16: 489; Prout 40:389; Tucker 24:35, 40; Tucker, Sampson 33:272t, 289).
128	Blue Jay prospect	SE¼ sec. 26, T26S, R32E, MDM, Keyes dist., 3 miles northwest of Bodfish	Gordon B. Begg, Bodfish (1957)	NE.-striking vein in granodiorite.	Prospect. No recorded production.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
129	Blue Jay prospect	SW¼SW¼ sec. 32, T28S, R34E, MDM, Piute Mts. area, 1 1/3 miles northwest of Claraville	John Wyss, P.O. Box 6, Claraville, owns one lode claim (1955)	Steep-dipping, quartz-filled shear zones, 3 to 18 inches wide, strike N. 10° W., NE., and E. In weathered Mesozoic granodiorite. Ore minerals not determined.	Developed by 160-foot crosscut adit driven N. 10° W., with raise to surface about 100 feet from portal. Adits driven 25 feet W., and 30 feet S. 70° W. about 100 yards east of raise. Production, if any, undetermined. (Tucker, Sampson, Oakeshott 49:214, 254t).
130	Blue Mountain (Dreadnot) mine	SW¼ sec. 12, T25S, R29E, MDM, on west slope of Blue Mt., 3 3/4 miles southeast of White River	D. D. Moore, Woody (1957)	Two parallel quartz veins strike northeast and dip 45° SW. in granitic rock. Veins range in width from a few inches to two feet, and contain free gold with pyrite.	Known in 1894, but active mainly between 1909 through 1923. Total production of more than 12,000 tons which averaged about 0.4 ounce of gold per ton; gold-silver ratio 2:1. Development consists of a 600-foot and an 800-foot inclined shaft and more than 4,000 feet of horizontal workings on three levels. Most recent active period was 1929-1931. Previously described in Tulare County. (Aubury 04;10t; Brown 16:492; Crawford 94:143, 296; 96:187, 188, 190, 469; Tucker 20:309; 29:31; Tucker, Sampson 33:273t, 293; Tucker, Sampson Oakeshott 49:255t).
	Bob Allen (General Grant)	Approx. NE secs., T25S, R28E, MDM, near Tulare Co. line on Slate Mt. 5 miles southwest of White River	Undetermined, 1957; P. C. Montgomery, Porterville (1896)	Eighteen-inch vein striking generally E. and dipping 60° N. in metamorphic rocks.	Uncorrelated old name. Probably abandoned. Developed by 24-foot shaft, 31-foot shaft, and 81-foot drift. Formerly described in Tulare County. Long idle. (Crawford 96:470).
131	Bobby prospect	NW¼SE¼ sec. 3, T30S, R40E, MDM, Rand dist., 1½ miles southwest of Randsburg near crest of north flank of Government Pk.	Clyde Johnson, Randsburg (1957)	Irregular fractures in quartz monzonite. Most of the fractures are few feet long and extend downward only few feet. Present owner was informed that small, thin shoots of moderately-rich ore were encountered in some of the excavation.	Two claims; formerly Old Glory No. 1 and No. 2. Developed by several shallow shafts, pits, and short adits, and a crosscut adit (caved) several tens of feet long. Small production. Idle.
	Bob Lee	Reported about 2 miles west of Kernville (old site) (1896); not confirmed, 1957	Undetermined, 1957	Free gold in vein in granite.	Uncorrelated old name; may be listed herein under different name. Three inclined shafts and Huntington mill in 1892. (Crawford 94:142; 96:187).
132	Bobtail mine	SW¼ sec. 6, T10N, R12W, SBM, Mojave dist. 5 miles southwest of Mojave, in a west facing canyon on northwest part of Soledad Mt.	Mrs. D. McAllister, Mojave (1958)	Gold- and silver-bearing quartz vein in rhyolite.	See text. (Aubury 04:8t; Julihn, Horton 37:24; Tucker, Sampson 33:272t).
	Bodfish Nos. 1 and 2	Reported in vicinity of Keyes (1904); not confirmed, 1957	Undetermined, 1957	Placer gold in gravel.	Uncorrelated old name; probably long abandoned (Aubury 04:18t).
	Bonanza				See Crystal.
	Bonanza	Reported in El Paso Gulch, 2 miles east of Red Rock (1939); not confirmed, 1958	Undetermined, 1958; J. H. Lovall, Randsburg (1939)	Placer gold in alluvium.	Eleven claims. Several hundred ounces of gold recovered by dry washing in 1894, again between 1907 and 1920, and few ounces in 1939. Idle since 1939. (Crawford 1896:187, 195t).
	Bond Buyer mine				See Klondike group. (Tucker 29:51; Tucker, Sampson 33:293-294).
	Bonnie Brea	Reported in sec. 11, T27S, R32E, MDM, 1 or 2 miles west of Bodfish (1904); not confirmed, 1958	Undetermined, 1958; A. McDonald, Los Angeles (1904)	One to 12 foot-wide quartz vein in granitic rock. Strikes NE., dips vertically.	Uncorrelated old name. Probably abandoned. (Aubury 04:9t).
	Boston Extension claim				Claim in Standard group (Aubury 04:9t; Tucker 23:160).
133	Boston Belle claim	W½ sec. 28, T25S, R33E, MDM, Cove dist., 2½ miles southwest of (new) Kernville, near the northwest short of Lake Isabella	Undetermined, 1958	Quartz veins in granitic rock.	Undeveloped claim. No recorded production. Idle. (Aubury 04:8t; Tucker 24:34).
	Boston fraction claim				One of the claims leased by International Mng. and Mlg. Co. during 1933, which see. (Tucker, Sampson 33:310).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
134	Boulder claim	NW¼SE¼ sec. 3, T29S, R38E, MDM, El Paso Mts. at mouth of small gulch on north side of Last Chance Cyn., 10 miles north-northeast of Cantil	Walter Bickel, P. O. Box 142, Inyokern (1958)	Gold-bearing Quaternary gravels which cap local ridges between stream channels and Recent gravels in stream beds. Gold occurs as flakes and small nuggets at base of gravels and locally above cemented layers in gravels. Bedrock is sedimentary rocks of Goler formation (Tertiary) and Mesozoic quartz monzonite.	One 20-acre placer claim. Probably a source of gold recovered by small-scale dry washing methods in 1890's and 1930's. The gravels are pock-marked with shallow excavations and the edges of them contain short adits. A shaft, about 30 feet deep, was being sunk to bedrock in the floor of Last Chance Cyn. in 1958. Owner recovers several ounces of gold annually and sells it to week-end visitors.
	Bowen	Reported in sec. 1, T27S, R32E, MDM, (1904); not confirmed, 1957	Undetermined, 1957; Frank Howard, Isabella (1904)	Quartz vein in granitic rock.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:9t).
	Bowman mine				See French mine.
135	Bright Spot	S½ of NW¼ sec. 35, T26S, R32E, MDM, Keyes dist., 2½ miles northwest of Bodfish	C. D. Bell, Bodfish (1957)	Northeast-striking vein in granitic rock.	No recorded production. Idle.
136	Bright Star mine	Center sec. 18, T28S, R34E, MDM, Piute Mts., 10 miles southeast of Bodfish	Undetermined, 1958; Mrs. Lacy, San Francisco (1949)	Gold-bearing quartz vein in fine-grained metamorphic rocks. Vein reported to have average width of 20 inches with a shoot of high-grade ore about 120 feet long (Brown, 1916, p. 490). Vein strikes N. 30° - 55° E. and dips 60° NW.	Discovered about 1870 and worked mostly before 1900 by which time gold valued at $600,000 was produced (Brown, 1916, p. 490). Few hundred ounces gold recovered from tailings 1898-1903. Few hundred ounces gold mined 1936-1941. Main shaft caved and covered over since then. Originally a 540-foot vertical shaft with 3 levels and several thousand feet of drifts and stopes. (Aubury 04: 9t; Brown 16:490; Crawford 94:142; 96: 187; Tucker 29:30; Tucker, Sampson 33: 272t; 40b:325; Tucker, Sampson, Oakeshott 49:255t).
	Bright Star	Reported in sec. 12, T25S, R29E, MDM, on western flank of Blue Mt. about 4 miles southeast of White River (1914); not confirmed, 1957	Undetermined, 1957; E. A. James, Woody (1914)	Two parallel veins, two feet wide, strike generally NE., dip 30° S.	Uncorrelated old name. Probably abandoned. Development consists of a 600-foot drift adit and 800 feet of other workings. Idle. (Brown 16:490; Tucker, Sampson, Oakeshott 49:255t).
	Brite-Burton mine				See Burton-Bright-Blank. (Tucker 35: 467, 469).
	British Lion	Reported in sec. 34, T27S, R33E, MDM, Piute Mts. (1904); not confirmed, 1957	Undetermined, 1957	Quartz vein in granite.	Probably part of Glen Olive group. (Aubury 04:9t).
	Brogan	Reported 2 miles south of Piute (1896); not confirmed, 1958	Undetermined, 1958; Wm. Shipsey, Piute (1896)	Quartz vein in porphyry; 6 to 12 inches wide; strikes NW., dips 65° NE.	Uncorrelated old name. May be listed herein under different name. Developed in 1896 by 42-foot and 80-foot shafts, both with short drifts at bottom. (Crawford 94:142-143; 96:187).
137	Broken Axel group	E½ sec. 20, T28S, R40E, MDM, Rademacher dist., 9½ miles south of Ridgecrest	Undetermined, 1957; R. Salisbury, Lancaster (1933)	Copper-stained shears in dioritic rocks.	Short prospect drifts and shallow open cuts. (Tucker, Sampson 33:272t, 294).
138	Broken Spade claims	SW¼NE¼ sec. 3, T29S, R38E, MDM, El Paso Mts., west side of Bonanza Gulch, 10½ miles north-northeast of Cantil	Thomas A. Tait, c/o Walter Bickel, P.O. Box 142, Inyokern (1958)	Gold-bearing Quaternary stream gravel in benches along Bonanza Gulch. Gravels are from few feet to more than 15 feet thick. Principal source of gold is from gravels in gullies down slope from the benches. Bedrock is sedimentary rocks of Goler formation (Tertiary).	Two 20-acre placer claims. Developed by shallow pits and open cuts along base of gravels and in small gullies. Probably some production of gold from small-scale dry washing methods in 1890's and 1930's.
	Brothers	Reported in sec. 3, T28S, R32E, MDM, Clear Creek dist., northwest of Havilah (1904); not confirmed, 1958	Undetermined, 1958; Glen Olive Mining Co., San Francisco (1904)	Seven veins, ½ to 1 foot wide, strike E., dip S., in quartz diorite.	Uncorrelated old name. May be listed herein under different name. Original workings consisted of a 50-foot inclined shaft and 125-foot adit, and a 25-foot open cut. (Aubury 04:9t; Brown 16:512).
	Bryan	Reported in sec. 19, T29S, R35E, (?), MDM, Piute dist., on a ridge south of Kelso Valley (1949); not confirmed, 1958	Undetermined, 1958; Dominic Domenghini, Bodfish (1949)	One- to 4-foot-wide vein strikes NW. and dips 10-15° SW.; in badly broken granitic rock.	Developed by 600-foot crosscut adit to vein with drift northwest 275 feet connecting with adit driven 300 feet southeast on vein from north side of ridge; 400-foot drift adit southeast 90 feet below 300-foot adit. Two raises connect from lower adit to upper level, 200 feet and 400 feet from portal. Production, prior to 1900, amounted to a few hundred ounces of gold (Tucker, Sampson 33:272t, 294; Tucker, Sampson, Oakeshott 49:255t).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Brymer prospect	Reported in sec. 22, T29S, R38E, MDM, El Paso Mts. (1952); not confirmed, 1958	Undetermined, 1958; A. F. Forrest, Randsburg ? (1952)	Undetermined.	An idle prospect; no production. (Dibblee, Gay 52:58t).
139	Buckboard mine	SE¼ sec. 10, T30S, R40E, MDM, southwest end of Stringer dist., 2½ miles south-southwest of Randsburg	Undetermined, 1957 (multiple ownership by individual claim holders)	Gold-bearing fault zone in schist strikes approximately west and dips about 50° N. Another vein occurs along footwall of rhyolite dike that strikes N. 30° W., and dips 45° NE. Average width of veins where stoped is 3 feet; maximum width 10 feet. Four ore shoots, 50 to 100 feet long, mined on fault zone north of main shaft. One ore shoot mined on vein along rhyolite dike. Each vein about 500 feet long. Projected intersection of veins is few feet south of main inclined shaft.	Formerly 6 claims. Now owned in part by J. B. Nosser (Police Dog claim), Johannesburg, and ____ Daley, address undetermined. Three inclined shafts, one vertical shaft, and approximately 2,000 feet of drifts and crosscuts at levels spaced at 50-100 feet intervals. Maximum depth is 450 feet on approximately 30° incline. Several stopes were developed. Total output reported to be $500,000 (Tucker, Sampson, and Oakeshott 1949, p. 215). Long idle. (Aubury 04:9t; Tucker, Sampson 33:272t, 294-295; Tucker, Sampson, Oakeshott 49:214-215, 255t).
	Buffalo	Reported in sec. 4, T29S, R29E, MDM, 9 miles northeast of Bakersfield (1904); not confirmed, 1958	Undetermined, 1958; A. Bessueille, Kern City (1904)	Placer deposit.	Uncorrelated old name; probably long abandoned prospect. (Aubury 04:18t).
	Bulgarian Troubles mine				See Glen Olive mine. (Aubury 04:9t).
	Bullion	Reported 1 mile west of Claraville (1896); not confirmed, 1958	Undetermined, 1958; Albert Bartholomy, Onyx (1896)	Quartz vein in granite; strikes N. 35° E.; few inches to 1½ feet wide.	Uncorrelated old name. May be listed herein under different name. (Crawford 94:143; 96:187).
	Bull Moose No. 1, No. 2, Extension claims				Claim of Pride of Mojave group. (Tucker 23:164).
	Bull Run (Sherman) mine	NE¼ sec. 28, T25S, R33E, MDM, Cove dist., 2 miles southwest of (new) Kernville, west side of Lake Isabella	Kern Development Co., C. S. Long, pres., Box 157, Hayward. Leased to Kern Mines Inc., Roland Toggnazzini, pres., 260 California St., San Francisco (1955)	Quartz veins in granodiorite.	See Big Blue group in text. (Aubury 04:9t; Brown 16:490; Crawford 94:143; Goodyear 88:321; Prout 40:389, 393, 416-417; Tucker 24:35, 40-41; 29:30; Tucker, Sampson 33:272t; 40b:329; Tucker, Sampson, Oakeshott 49:255t).
	Bully Boy mine				See Lucky Boy mine. (Aubury 04:9t, 17t; Hulin 25:25, 132; Tucker 23:171; 29:30-31; Tucker, Sampson 33:272t; Tucker, Sampson, Oakeshott 49:255t).
	Burcham claim				Patented claim of Yellow Aster mine. (Aubury 04:9t; Crawford 96:187, 194; Tucker 33:272t).
140	Burning Moscow mine	N½ sec. 25, T28S, R34E, MDM, Bright Star Cyn., Piute Mts., 13 miles south of Weldon	Undetermined, 1957; Piute Mining Co., Bakersfield (1933)	Quartz vein from 2 to 4 feet wide in quartz monzonite. Vein strikes N. 70° E., dips 60°-70° S., and contains gold, pyrite, and copper-bearing minerals.	Developed by 550-foot crosscut adit with 400 feet of drifts; a 700-foot drift adit; a 150-foot shaft; and several smaller exploratory workings. Most of the workings are on south side of Bright Star Cyn. Minor output of gold and copper about 1934. Remains of 4-stamp mill on property in 1957. Long idle. (Eric 48:254t; Tucker, Sampson 33:272t, 295-296; Tucker, Sampson, Oakeshott 49: 215, 255t).
141	Burton-Brite-Blank (Brite, Burton) mine	NW¼ sec. 16, T10N, R13W, SBM, Mojave dist., on north-east-facing slope of southeast part of Middle Buttes	Middle Butte Mine, Inc., c/o Emory L. Morris, 601 First National Bank Building, Santa Ana. Leased to Martin Beck, Rosamond; Sub-leased to James and Victor Wright, Rosamond	Four- to 6-foot-wide vein strikes N. 26° W., dips 40° S.; in latite porphyry.	See text. (Julihn, Horton 37:33; Tucker, Sampson 35:468, 469, 471; Tucker, Sampson, Oakeshott 49:215, 216, 255t).
142	Butte (Big Butte, Butte Lode, Butte Wedge) mine	SW¼ sec. 36, T29S, R40E, MDM, at east end of town of Randsburg	Butte Lode Mining Co., P.O. Box 195, Randsburg, Bert Wegman, pres. (1957)	Fault lode veins in schist.	See text. (Aubury 04:9t; Boalich, Castello 18:12t; Crawford 96:187; Eric 48:254t; Hulin 25:80, 132; Tucker, Sampson 33:272t, 291; 40:11, 29; Tucker, Sampson, Oakeshott 49:216, 255t).
143	Butte prospect	NW cor. sec. 8, T28S, R40E, MDM, Rademacher Dist., 7 miles south of Ridgecrest	Undetermined, 1957	Copper-stained brecciated layer 3 feet thick, in fault zone in dioritic rock strikes N. 80° E., dips 50° NW.	Developed by inclined shaft of undetermined depth. (Tucker, Sampson 33:272t).
	Butte Fraction claim				See Butte mine. (Aubury 04:9t).
	Butte Wedge claim				See Butte mine. (Aubury 04:9t; Crawford 96:188; Tucker, Sampson 33:272t; Tucker,

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Butte Wedge claim (continued)				Sampson, Oakeshott 49:255t.
144	Cactus Queen (Blue Eagle, Cactus) mine	SW¼NW¼ sec. 17, T10N, R13W, SBM, Mojave dist., on southwest part of Middle Butte	Cliff G. Burton, Rosamond (1958)	Seven-foot vein strikes N. 45° W., dips 36 to 40° SE. in latite porphry.	See text. (Eric 48:254t; Gardner 54:51, 55; Julihn, Horton 37:4, 34, 35; Tucker, Sampson 35:467-469, 471, 472; 40:10, 29-30; Tucker, Sampson, Oakeshott 49:216-217, 255t).
	Calcium claim				Claim of Queen Esther mine. See text under under Golden Queen mine. (Tucker 23:162; Tucker, Sampson 33:282; 35: pl. 7).
	Caldwell	Reported in sec. 18, T26S, R33E, MDM, north of Isabella Dam (1914); not confirmed, 1958	Undetermined, 1958; A. R. Kiester, Isabella (1914)	Six-inch vein of "high-grade" ore in granitic rock.	Uncorrelated old name. Probably within Isabella Reservoir land withdrawal. Originally developed by 620-foot drift adit and short crosscuts. (Brown 16: 490; Tucker, Sampson, Oakeshott 49:256t).
145	California mine	SW¼NW¼ sec. 1, T30S, R40E, MDM, Rand dist., in Fiddlers Gulch, 1 mile southeast of Randsburg	Robert G. Mitchell, Randsburg, and Charles Potter, 1662 Sierra Way San Bernardino (1957)	Gold-bearing shear zone in schist strikes N. 75° W., dips 55° NE. Vein poorly exposed on surface but has well-defined walls in the mine. Probably extends along surface about 150 feet. Terminated by fault a few tens of feet west of shaft. Ore of undetermined grade mined from 2 nearly flat shoots at intersections of main fault and vertical, sub-parallel shears in footwall.	Two patented claims and 4 unpatented claims. Principal shaft is 250 feet deep on an incline of about 60° NE. Drifts a few tens of feet long have been extended northwest on the 80- and 105-foot levels. Shallow workings developed to the east and south of shaft. Minor production since 1942. Production previous to 1942 probably included with production from Yellow Aster mine when claims were part of that group. See Hardcash claim. Idle. (Aubury 04:09t; Crawford 96:188, 194; Hess 10:40).
	Camp Bird claim				Claim in Standard group (Tucker 23:160).
	Canfield Co.'s mines	Reported in Bonanza Gulch, 2 miles east of Red Rock (1896); not confirmed, 1958	Undetermined, 1958; Canfield Mining Co., Los Angeles (1896)	Placer gold deposits.	Fifty-one claims in Bonanza Gulch. About 650 oz. gold recovered in 1894. Claims probably listed herein under different names. (Crawford 94:143; 96:188).
	Carolina A	Reported in sec. 11, T27S, R32E, MDM (1904); not confirmed, 1958	Undetermined, 1958; A. McDonald, Los Angeles (1904)	Three- to 5-foot vein strikes NE., dips vertically with granitic hanging wall and metamorphic footwall.	Uncorrelated old name. May have been part of Bonnie Brea property. Probably abandoned. (Aubury 04:9t).
	Cash Register mine				See Klondike group (Tucker 29:51).
	Castle Butte (Lost Cabin) mine	Reported in sec. 24, T29S, R34E, MDM, Piute dist., 4 miles southeast of Claraville, north of Cottonwood Creek near Lee Spring (1933); not confirmed, 1958	Undetermined, 1958; Lee Arell, J. N. Harvey, and George Purvis, Bakersfield (1933)	Vein 2 to 4 feet wide strikes NE., dips 70° SE.; in granitic rock. Another vein strikes N. and dips 70° W. Two veins intersect below cabin site. Veins consist of quartz with pyrite, marcasite, and free gold.	May be part of Locarno-Simon group, which see under tungsten. Developed by several drift adits as much as 150 feet long and a 50-foot shaft. No recorded production. (Tucker, Sampson 33:273t, 296).
146	Chamberlain (New Dawn Amended, Saddle Ammended claims) group	SW¼ sec. 1, SE¼ sec. 2, T29S, R39E, MDM, El Paso Mts., west side of Goler Cyn. 14 3/4 miles northeast of Cantil	William A. Hubber, 4223 Eagle Rock Blvd., Los Angeles, Ray Bennett, Sun Valley, and Thomas J. Hubber, Lancaster (1958)	Placer gold in form of dust, flakes, and nuggets in Quaternary gravels. Gold obtained from deposits at base of gravels and in gullies downslope from the gravels. Bedrock is sedimentary rocks of Tertiary Goler formation, which is auriferous in part, and metamorphic rocks of the Permian (in part) Garlock series.	One of the principal sources of nugget gold in the Goler Cyn. area during 1890's and 1930's. See also Janney group, Goler Canyon placers, and Jewell group. (Dibblee, Gay 52:60t; Tucker, Sampson, Oakeshott 49:217, 256t).
	Charity claim				Claim of Elephant group. (Tucker 23: 159).
147	Chief group	Center, E½ sec. 22, W½ sec. 23, T27S, R29E, MDM, 4 miles south-southeast of Granite Station, at head of Moore Cyn.	N. W. Moore, Granite Station (1956)	Narrow quartz veins strike NE. to E., vertical; in hornblende-biotite granodiorite.	Discovered prior to 1896 by D. M. Dresser, Bakersfield. Developed by 120-foot and 380-foot adits. No recorded production. Idle. (Brown 16:490-491; Crawford 96:188; Tucker, Sampson 33:273t; Tucker, Sampson, Oakeshott 49:256t).
	Chief claim				Claim in Gwynne mine. (Tucker, Sampson 33:307-308).
	Chief Assistant claim				Placer claim formerly in Goler Cyn. placer group; now part of Jewell group. (Tucker, Sampson 33:306-307).
	Chief Commander claim				Former claim of Goler Cyn. Placer group; now included in Putnam group (Tucker, Sampson 33:306-307).
	Chieftain				Uncorrelated old name; may be part of Commonwealth mine (Aubury 04:9t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Cincinnatti prospect	Reported in Goler dist., El Paso Mts. (1896); not confirmed, 1958	Undetermined, 1958; M. R. Williams, Randsburg (1896)	Placer gold in alluvium.	Worked by dry washing in 1890's with low daily yield of gold. Probably listed herein under different name. (Crawford 96:188, 190t).
	Clara Gibbons	Approx. T25S, R29E, MDM, in Chileno (Grizzly ?) Gulch, 3 miles southeast of White River (1894); not confirmed, 1957	Undetermined, 1957; C. H. Gibbons, A. Brown, White River (1894)	Quartz vein 6 inches to 2 feet wide strikes NE., dips 45° SE.; in granitic rock.	Uncorrelated old name. Probably abandoned. Developed prior to 1900 by 90-foot inclined shaft, 100-foot drift, and 125-foot crosscut adit. Previously described in Tulare County. (Crawford 94:296; 96:469).
148	Claraville placers	Secs. 3, 4, 5, T29S, R34E, MDM, and vicinity. Piute Mts. area, along Kelso Cr. and headwater tributaries from about 1 miles west of Claraville to Landors Meadows about 1½ miles east of Claraville	Undetermined, 1958; A. V. Fulton, Cantil, operator (1933)	Gravels in creek banks as much as 15 feet high, overlie Mesozoic granodiorite. Fine gold with some small nuggets is present; derived from nearby stringers and quartz veins.	Placer gravels in creek beds and banks worked intermittently for many years by various operators at various places by small scale placer methods. Production undetermined. (Tucker, Sampson 33:273t, 296; Tucker, Sampson, Oakeshott 49:256t).
	Claude mine				See Minnehaha mine in text under tungsten.
	Clay Bank mine				See Rand group. (Crawford 94:143; 96:188).
	Collar Button prospect			Quartz vein 2 feet wide, in "slate".	A prospect west of Bright Star mine and owned by W. B. Grant in 1916. Probably same as "Old Grant shaft" listed under Jenette-Grant mine. (Aubury 04:9t; Brown 16:491; Tucker, Sampson 33:273t; Tucker, Sampson, Oakeshott 49:256t).
	Columbia				Uncorrelated old name; may be part of Commonwealth mine (Aubury 04:9t).
	Columbia (Zig Zag)	Reported in sec. 26, T26S, R32E, MDM, (1904) not confirmed, 1957	Undetermined, 1957; A. Radke, Keyes, (1904)	Three veins 12 to 20 inches wide, strike N., dip 68°; in granitic rock.	Uncorrelated old name. May be listed herein under another name. Development consists of 25-foot shaft, 60-foot incline, 650 feet of drifts. (Aubury 04:9t).
	Comet	Reported approx. sec. 13, T27S, R32E, MDM (1896); not confirmed, 1957	Undetermined, 1957; Andrew McNitt, White River (1896)	Eight inch, NE.-striking vein, dips 45°SE.; in granitic rock.	Uncorrelated old name, probably abandoned. Developed by 50-foot shaft and 50-foot adit. (Crawford 96:188).
	Commonwealth claim				Claim in Big Blue group. (Aubury 04:9t; Brown 16:482, 491; Crawford 94:143; Tucker 24:41; Tucker, Sampson 33:273t, 281, 40b:325; Tucker, Sampson, Oakeshott 49:256t).
	Confidence claim				See Rand group. (Aubury 04:9t; Goodyear 88:316).
	Confidence group				See College Girl group under copper. (Dibblee, Gay 52:59t; Tucker, Sampson 33:296-297).
	Consolation	Reported in sec. 27, T28S, R38E, MDM, El Paso dist. (1904); not confirmed, 1958	Undetermined, 1958; D. W. Decker and Co., Garlock (1904)	Quartz veins in metamorphic rocks. Veins strike NW., dip NE., and contain iron sulfides and oxides.	Thirteen claims in 1904. Probably long abandoned. Rocks in reported location are Tertiary sedimentary rocks and Quaternary basalt. (Aubury 04:9t).
149	Consolidated (Good Hope, Kenyon, Kinyon) mine	SE¼ sec. 35, T29S, R40E, MDM, east end of town of Randsburg	Consolidated Mines Co., 1402 S. Wilton Pl., Los Angeles (1949)	Two veins in Rand schist.	See text. (Aubury 04:11t, 12t, 17t; Boalich, Castello 18:12t; Brown 16:496; Crawford 96:188, 191. Fink 16:688; 26:702; Hulin 25:80, 132-133; Jenkins 42:330t; Tucker 21:309; 29:31; Tucker, Sampson 33:273t, 297; Tucker, Sampson, Oakeshott 49:259t).
	Content	NW¼ sec. 33 and SW¼ sec. 28, T25S, R33E, MDM, Cove dist., 2½ miles southwest of (new) Kernville, west side of Lake Isabella	Kern Development Co., C. S. Long, pres., Box 157, Hayward. Leased to Kern Mines Inc., Roland Toggnazzini, pres., 260 California St., San Francisco (1955)	Quartz veins in shear zone in Mesozoic granodiorite and alaskite.	See Big Blue group in text. (Aubury 04:9t; Brown 16:489, 505; Crawford 94:143; Prout 40:385, 389, 390, 392; Tucker 24:41; Tucker, Sampson 33:273t, 289; Tucker, Sampson, Oakeshott 49:256t).
	Copenhagen prospect				See Donnie prospect.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Copper Age	Reported in sec. 13, T28S, R39E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; Wissahickon Gold and Copper Mng. Co., Searles (1904)	Sulfides in limestone and porphyry.	Uncorrelated old name; may be property listed herein under different name. Sixteen claims, 100-foot incline, 65-foot drift. (Aubury 04:9t).
	Copper King	Reported in sec. 12, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; J. W. Short, Randsburg (1904)	Quartz vein with "sulphide" and bismuth in granitic rocks.	Uncorrelated old name. Formerly included Silver Queen and Silver Link group of claims. (Aubury 04:9t).
	Copper Wire	Reported in sec. 14, T28S, R39E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; D. O'Donoghue, Searles (1904)	Quartz vein with sulfides in granite and limestone.	Uncorrelated old name; may be property listed herein under different name. Developed by 200-foot incline. (Aubury 04:9t).
	Cowboy				See Gold Peak and Cowboy mine in text under silver.
150	Crescent prospect	E½SE¼ sec. 17, T10N, R13W, SBM, 8½ miles northwest of Rosamond, on Middle Butte	Mrs. Geo. B. Kimball, 1701½ Glencoe Way, Glendale 8 (1958)	Narrow northwest-striking quartz vein in rhyolitic volcanic rock. Kaolinitic and alunitic alteration evident along walls of the vein.	Developed by shallow open cuts and short adits. No known production. (Julihn and Horton, 1937, p. 34).
	Croesus (Little Charlie) group	Approx. sec. 6, T30S, R38E, MDM, 2 miles northwest of Gypsite siding of Southern Pacific R.R., southeast flank of El Paso Mts.	Undetermined, 1958; Formerly Mrs. J. S. Bishop (deceased)	Gold-bearing quartz vein, 6 inches to 2 feet wide, strikes N. 40° W., dips 75° SW.; in metamorphic rocks.	Formerly 3 claims; abandoned by Bishop family. May be listed herein under different name. Developed by 200-foot drift adit driven northwest. Active in 1933 but probably no production. (Dibblee, Gay 52:59t; Tucker, Sampson 33:315-316; Tucker, Sampson, Oakeshott 49:217, 256t).
	Croesus mine				See Pinmore mine (Brown 16:507).
	Crown	Reported in sec. 35, T27S, R40E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957	In metamorphic rocks.	Uncorrelated old name; may be part of Red Wing mine, which see. Developed by 15-foot and 30-foot drifts and 20-foot open cut. (Aubury 04:9t).
	Crown claim				Claim of Red Wing mine, which see.
	Crystal (Bonanza)	Reported in sec. 2, T29S, R31E, MDM, 22 miles north of Caliente (1916); not confirmed, 1958	Undetermined, 1958; A. R. Cox, Bakersfield (1916)	Ten inch to 2 foot-wide vein in granitic rock.	Uncorrelated old name. Probably abandoned prospect. Originally developed by 120-foot shaft. (Aubury 04:9t; Brown 16:491).
151	Culbert (Josephine T.G.) group	NE cor. sec. 10, T30S, R40E, MDM, Rand dist., 1 3/4 miles southwest of Randsburg, in center of small valley south of Government Pk.	Flora Dye, W. C. Dick, Mrs. Gerogetta Roush, addresses undetermined (1958)	Gold-bearing siliceous vein in fault zone strikes N. 70° E. and dips 65° N. Vein composed of brecciated, iron-stained, and silicified schist in multiple fault zone in Rand schist. Principal ore shoots appear to be at intersections of main zone with sub-parallel, vertical to steeply-south-dipping shears in footwall. Poor exposure of vein for about 400 feet in nearly level valley floor. Other irregular veins on east and north side of small hill about 1,800 feet southwest of principal workings. Average content of all ore mined was 0.85 oz. gold per ton. Ranged from 0.16 to 1.7 oz. of gold per ton. Also low grade manganese near southwest workings.	Fifteen claims. Principal workings are several hundred feet of drifts extended on several levels from an inclined shaft at least 400 feet deep. Some near-surface stopes near shaft and several other shafts of undetermined depth. Several short adits and narrow surface stopes in area to southwest of main vein. An early discovery in the Rand district but production probably not greater than several hundred ounces of gold. Most of ore mined 1901-1905, 1910-1915, and 1929-1938. Other periods of small production; most recent was 1951. (Brown 16:498-499; Trask, Wilson, Simons 43:16t, 123t; Trask et al 50:84).
	Cunningham group				See Jewell group. (Dibblee, Gay 52:60t; Tucker, Sampson, Oakeshott 49:217-218, 256t).
	Curly Jim mine				See Ruby mine. (Tucker, Sampson 33:324).
	Custer	Reported in sec. 4, T27s, R32E, MDM, (1904); not confirmed, 1957	Undetermined, 1957; B. Chavis, Havilah (1904)	Two quartz veins strike generally NE., dip E.; in granitic rock.	Uncorrelated old name. May be listed herein under another name. Development consists of a 200-foot inclined shaft, several adits 50 to 200 feet long, and 600 feet of drifts. (Aubury 04:9t).
	Daly claims				See McKendry group. (Dibblee, Gay 52:60t).
	Darwin	Reported in sec.3, T28S, R32E, MDM, (1888); not confirmed, 1958	Undetermined, 1958		Uncorrelated old name. Probably now part of Rand group. (Goodyear 88:316).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	David King and Tango prospect				See Waterhole prospect. (Tucker, Sampson 33:273t; Tucker, Sampson, Oakeshott 49:256t).
	Davis	Reported approx. in T27S, R31E, MDM (1896); not confirmed, 1957	Undetermined, 1957; Wm. Davis, Bakersfield (1896)	Two-foot vein strikes west, dips 45° N.; in granitic rock.	Uncorrelated old name. Probably abandoned. (Crawford 96:188).
152	Dead River Channel prospect	Reported in sec. 17, T26S, R33E, MDM, Isabella area, 2 miles north of Isabella dam	Undetermined, 1958	A 300-foot-wide gravel bed 6 to 8 feet deep in an east-flowing tributary to Kern River. Gravel rests on granitic rock. Average pay of gravel reported to be 50¢ per cubic yard.	Mostly inundated by Isabella Lake. Mined intermittently since 1890. Production undetermined. (Aubury 04:18t; Brown 16:491; Tucker, Sampson 33:273t, 297; 40b: 326; Tucker, Sampson, Oakeshott 49:256t).
	Dead Tree claim				Claim in Gwynne mine, which see. (Aubury 04:9t, 17t; Brown 16:498, 499; Tucker 29:36; Tucker, Sampson, Oakeshott 49:257t).
153	Dearborn mine	North central sec. 36, T29S, R34E, MDM, Piute Mts. area, 5½ miles north of Claraville, south of Geringer Grade Rd., about ¼ miles west of Cottonwood Cr. crossing	J. C. Geringer estate (1958), Bank of America, Bakersfield, trustee	Gold-bearing quartz stringers and veins as much as 6 inches wide occur in shear zone 3- to 4-feet wide striking N. and dipping 20° W.; in deeply weathered Mesozoic granodiorite.	Developed by 3 inclined adits 50 feet or more in length, with undetermined lateral openings and mined from stope about 100 feet on strike, 50 feet on dip, and 4 feet wide. Workings partly caved and filled with decomposed country rock and water. Long inactive and largely inaccessible in 1955. Production undetermined. (Tucker, Sampson 33:273t, 297; Tucker, Sampson, Oakeshott 49:257t).
154	Deerhunter (?) prospect	SE¼ sec. 31, T30S, R33E, MDM, Loraine dist., 2 3/4 miles southwest of Loraine, between Antimony ridge and Studhorse Cyn.	Tom Davies, Caliente, 1958	Six inch to one foot-wide shear zone strikes N. 70° W. and dips 23° NE.; in deeply-weathered quartz diorite. Vein consists mainly of iron-stained fault gouge. Apparently weakly mineralized at intersection with a second shear which strikes N. 85° E. and dips 60° SE.	Developed by 65-foot drift adit, 40-foot inclined shaft, and 4 by 10 by 10-foot surface stope. No production. Idle.
	Deerhunter mine	Reported in sec. 20, T30S, R34E, MDM, Loraine dist., 5 miles east of Loraine near Horse Cr.; not confirmed, 1958	Undetermined, 1958; M. D. Elliot, Piute (1949)	Quartz vein, 1 to 2 feet wide strikes N. 40° E., dips 50° SE.; schist hanging wall and granitic footwall. Ore shoot 1 foot wide, 60 feet long, and 80 feet long down the dip.	Developed by several drift adits; longest is 400 feet. Ore stope 3 feet wide, 80 feet high, and 60 feet long. Mined approximately 50 tons of ore from stope. Some ore averaged 2 ounces per ton. (Brown 16:491; Tucker 33:273t; Tucker, Sampson, Oakeshott 49:257t).
	Defender claim				Patented claim of Yellow Aster mine. (Aubury 04:10t; Crawford 96:188).
	Defiance	Reported in sec. 32, T11N, R12W, SBM, Mojave dist., (1904); not confirmed, 1958	Undetermined, 1958; C. C. Calkins, K. A. Calkins, Mojave (1904)	Three 4-foot veins strike N., dip E.; in porphyry and granite.	Uncorrelated old name. May have been claim of Four Star Mine. (Aubury 04:10t).
155	Demand Note prospect	NW¼ sec. 11, T29S, R39E, MDM, El Paso Mts. 2 miles north-east of Garlock, in Iron Cyn. and ridge on east side of cyn.	Undetermined, 1958; Real Goulet, P.O. Box 864, Bishop (1952)	Shear zones and quartz stringers of various orientation in metamorphic rocks. Green oxides of copper and traces of gold occur in parts of the shear zones.	Probably no production except for possible recovery of placer gold from alluvium. An old prospect developed by two drift adits driven S. 10° W. about 200 feet from east side of ridge east of Iron Cyn., and N. 60° E.-driven adits and vertical shafts in Iron Cyn. Long idle. (Dibblee, Gay 52:59t).
	Democrat	Reported sec. 8, T28S, R31E, MDM, (1904); not confirmed, 1958	Undetermined, 1958; W. R. Rose, Auburn (1933)	Eight inch to 7 foot-wide quartz vein strikes NE., dips 32° SE.; in granitic rock.	Uncorrelated old name. Probably abandoned. (Aubury 04:10t, 17t).
	Desert claim	Reported in sec. 32, T11N, R12W, SBM, Mojave dist., 3 miles south of Mojave on Standard Hill (1904); not confirmed, 1958	Undetermined, 1958; Desert Mining Co., Mojave (1904)	Twelve-foot vein strikes N., dips E.; in porphyry.	Uncorrelated old name. Probably listed herein under another name. (Aubury 04:10t).
	Desert Queen mine				See Standard group in text. (Julihn, Horton 37:27; Tucker 23:160, 161; Tucker, Sampson 33:301, 302; 34:11; 40:35, 36).
	Desert Queen claim				Patented claim of King Solomon mine at Johannesburg, which see. (Aubury 04:10t).
	Dirego	Reported in sec. 4, T28S, R32E, MDM, Clear Cr. dist. (1904); not confirmed, 1958	Undetermined, 1958; Geo. Carelton, Havilah (1904)	Three parallel veins in granitic rock.	Uncorrelated old name. Probably abandoned prospect. (Aubury 04:10t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Discovery claim	W½ sec. 5, T10N, R12W, SBM, Mojave dist., lower north-east slope of Soledad Mt.	Mojave Mining & Milling Co., Mojave (1958)		Claim name of Mojave Mining & Milling Co. (Aubury 04:10t).
156	Doble (Summit, Wall Street) mine	NE¼NE¼ sec. 19, T28S, R34E, MDM, Piute Mts., north end of French Meadows, 11 miles southeast of Bodfish	Undetermined, 1958; Jenette-Grant Mining Co. (1940)	Gold-bearing quartz vein in fine-grained metamorphic rocks.	A long-abandoned caved shaft. May be same as Yellow Boy shaft. Probably part of Jenette-Grant mine claims. (Brown 16:511; Tucker, Sampson 33:276t, 333; Tucker, Sampson, Oakeshott 49:269t).
	Dolly	Approximately sec. 19 (?), T30S, R33E, MDM, Loraine dist., just north of Caliente Cr. (1896); not confirmed, 1958	Undetermined, 1958; A. Souser, Caliente (1896)	Three quartz veins strike N. 60°-70° E.; in weathered porphyritic rock.	Uncorrelated old name. May be listed herein under another name. Developed by short adits on 3 levels. (Crawford 94:143; 96:188).
157	Donnie (Copenhagen, Sargert) prospect	East side sec. 6, T29S, R34E, MDM, Piute Mts. area, 1½ miles west of Claraville, west side of Kelso Cr. tributary	Allen W. Sargert, P.O. Box 971, Weldon (1955)	Quartz veins, about 12 in. wide and 25 feet apart strike N. 65°-70° E. and dip steeply through deeply-weathered Mesozoic granodiorite.	Developed by 3 adits, 100 to 150 feet long, driven southwest on the veins and 100 to 200 feet apart; also a 120-foot crosscut. All portals badly caved in 1955 and the workings almost inaccessible. Idle; production, if any undetermined. (Tucker, Sampson, Oakeshott 49:218, 257t).
	Dos Picannini prospect	Reported in Fiddler Gulch, 1 mile east of Randsburg (1896); not confirmed, 1957	Undetermined, 1957; Benson Bros., et.al. Randsburg (1896)	Quartz vein.	Extension of vein on Maria claim. Last reported 1896, probably known by different name now. (Crawford 96:188).
	Double Standard claim	NW¼ sec. 5, T10N, R12W, SBM, 4½ miles south of Mojave on north slope of Soledad Mt., east of Karma mine	Mojave Mining Co. Milling Co., Mojave (1958)	Three- to 5-foot-wide vein strikes northeast, dips 40° NW.; in quartz latite porphyry.	See Mojave Mining & Milling Co. property. (Aubury 04:10t; Brown 16:491, 492; Tucker 23:158; 29:31; Tucker, Sampson 33:273t, 283; 35:468; Tucker Sampson, Oakeshott 49:257t).
	Double Standard prospect				See Sixteen to One (Aubury 04:15t).
	Double Thirteen prospect				See Sidewinder mine.
	Dreadnot mine				See Blue Mountain mine (Aubury 04:10t; Brown 16:492; Crawford 94:143; Tucker 29:31; Tucker, Sampson 27
158	Drunkards Dream mine	SW¼ sec. 10, T28S, R33E, MDM, Clear Cr. dist., 4 miles east of Havilah, north side of King Solomons Ridge	L. C. Schaefer, (1957) address undetermined	Two parallel veins strike N. 70° W. and dip 45° NW. in granitic rock, and join at depth of 50-feet. Ore consists of quartz, granite gouge, and free gold in a 2- to 4-foot wide zone. A fault striking parallel to the vein but dipping 65° SE. displaces vein, possibly to the north. Average gold content of ore milled was about ½ oz. per ton.	Discovered in 1933 when rich float was found by J. L. Stubblefield on the slope of the ridge. The vein was found after trenching along the slope. Development consists of a 170-foot crosscut adit N. 40° W. to the vein, a 375-foot drift west, a 25-foot shaft, and several open-cuts disposed along the vein. Ore was milled in 10-ton Huntington mill situated on the property. Idle since about 1938. (Tucker, Sampson 33:298; 34:313, 315; 40b:326; Tucker, Sampson, Oakeshott 49:257t).
159	Eagle claim	NW sec. 6, T27S, R32E, MDM, Greenhorn dist., about 2 miles east-southeast of Davis Guard Sta.	E. C. Fuhr (1957) address undetermined	Narrow fracture zone strikes N. 50° E., dips 70°-80° SE.; in granodiorite.	Workings consist of two shafts of undetermined depth (one caved) and several caved surface cuts. Numerous mounds of gravel indicate placer mining long ago. No recorded production. Idle.
	Eagle Roost claim				Lode claim of Jewell group. (Dibblee, Gay 52:59t).
	Eagles Nest claim				Former claim of Ashford Mines. (Crawford 96:188).
	Early Sunrise mine				See High Grade group. (Brown 16:492; Tucker 29:45; Tucker, Sampson 33:273t).
160	Ebers and Heaps property	SW¼SW¼ sec. 3, T29S, R38E, MDM, El Paso Mts., 9 3/4 miles north-northeast of Cantil	Mildred Ebers and ___Heaps, addresses undetermined (1958)	Gold-bearing Quaternary gravels several feet thick cap flat-topped ridge west of Bonanza Gulch.	Probably some production of placer gold. Not as extensively-developed as other claims in Bonanza Gulch.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Echo mine			Quartz vein in rhyolitic rocks.	See text under Golden Queen mine. (Aubury 04:10t, 17t; Brown 16:497; Julihn, Horton 37:20; Tucker 23:158, 159; 29:31, 32; Tucker, Sampson 33:273t, 279, 280, 283, 298, 299; 35:465, 472, 473; 40:33, 34; Tucker, Sampson, Oakeshott 49:257t).
	Eckley & Mountain View claim				Former claim name. See Elephant group. (Aubury 04:10t).
	Ederl group				See Porter group. (Tucker, Sampson 33: 299, 300; Tucker, Sampson, Oakeshott 49:257t).
	Edith prospect				See Golden Cross prospect under silver (Aubury 04:10t).
161	Edith E mine	SE¼NW¼ sec. 12, T29S, R39E, MDM, Goler dist., 2½ miles northeast of Garlock, at mouth of Goler Cyn., southwest flank of El Paso Mts.	Charles Berry, P.O. Box 263, Randsburg (1958)	Recent stream gravel as much as 65 feet deep on northwest side of Goler Cyn. immediately below point where cyn walls widen. Part of the gravel may be fanglomerate overlapped by stream gravel. Principal source of the mined gold has been from gravel just above bedrock and from crevices in bedrock. Gold ranges in size from very tiny particles to nuggets weighing several ounces.	One 20-acre placer claim. One of the earliest sources of placer gold in the Goler dist. Probably several hundred ounces of gold produced from the property. Most recent production of gold was several tens of ounces in 1934-1936. Developed by 17 vertical shafts, 10 to 65 feet deep, with one to 4 drifts extended 15 to 60 feet from each shaft. Idle since 1935.
162	Elbow and Boulder prospect	Sec. 33, T27S, R31E, MDM, on Kern River about 1¼ miles northeast of Democrat Springs	Harold Bankson, 2007 Cedar St., Bakersfield (1957)	Recent gold-bearing river gravel.	Idle. Most recent reported activity was a sand pumping operation by H. D. Smith, W. M. Cambell, and L. M. Duncun in 1931, (Tucker, Sampson 33:300; Tucker, Sampson, Oakeshott 49:257t).
163	Eldorado prospect	NE¼ sec. 33, T27S, R40E, MDM, Rademacher dist., 5½ miles south of Ridgecrest	Undetermined (1957)	Poorly exposed quartz vein, 3 inches wide, strikes N. 10° W., dips 55° NE.; in quartz monzonite. Vein crosses a vertical diorite dike and follows a fracture zone in rhyolite along part of its surface trace.	Developed by 60-foot vertical shaft in rhyolite and 15-foot shaft in quartz monzonite. A prospect; idle.
164	Elephant group (Hope, Excelsior, Elephant-Eagle)	W½ of sec. 6, T10N, R12W, SBM, 5 miles southwest of Mojave on the extreme northwest part of Soledad Mt.	Goodwin J. Knight, Los Angeles (1958)	Three sub-parallel veins in quartz latite porphyry, strike N.20W., dip from 60° NE. to vertical.	See text. (Aubury 04:10t; Brown 16:492; Tucker 23, 159; 29:32, 33; Tucker, Sampson 33:273t, 279, 283, 300; 34:315; 35:465, 468, 469, 472-474; 40:33, 34; Tucker, Sampson, Oakeshott 49:257t).
	Elephant-Eagle mine				See Elephant group. (Tucker, Sampson 35:472-474; 40:33, 34).
	El Friday	Reported in Loraine dist. 3 miles SW. of Amalia mine (1904); not confirmed, 1958	Undetermined, 1958; Finley and Sweet, Kernville (1904)	Three- to 4 foot-wide vein strikes E., dips vertically; in porphyritic rock.	Uncorrelated old name. May be listed herein under another name (Aubury 04:10t).
	Eli group	Reported in sec.6, T31S, R34E, MDM, Loraine dist., 5 miles southeast of Loraine between Stevenson and Indian Cks. (1904); not confirmed, 1958	Undetermined, 1958; J. N. Thomson & Co. Kern City (1904)		Uncorrelated old name. Probably long abandoned. (Aubury 04:10t).
165	Elizabeth prospect	Approx. center east half sec. 4, T30S, R40E, MDM, Rand dist., 2 miles southwest of Randsburg, on northwest side of Rand Mts.	Fred L. Moore (1957) address undetermined	Fault in schist strikes N. 70° W., dips 55° NE., and is composed of 4-foot-wide zone of brecciated schist. Length undetermined but at least few tens of feet. Fault contains lenses of brecciated quartz approx. 2 feet wide and 6 feet long. Manganiferous material occurs in hanging wall of fault and in quartz and quartzite at several places in nearby area.	Owned by ___ Patterson in 1925; claim named undetermined. Developed by inclined shafts and prospect holes. Production, undetermined. Long idle.
	Elk claim				Former claim in Elephant-Eagle group. (Tucker 23:159; Tucker, Sampson 35:pl.7).
166	Ella group	NE¼ sec. 15, T30S, R33E, MDM, Loraine dist., 3/4 mile north of Caliente Cr., and ½ mile east of Sand Cyn.	Undetermined, 1958, Ted Adamson and M. Abbott, Rosamond (1939)	Two-foot-wide quartz vein strikes N. 25° E., dips 65° SE. Pale blue-gray schist in hanging wall and highly altered granitic rock in footwall.	Developed by a crosscut adit driven 220 feet to the vein, a 60-foot drift N. 25° E. to the bottom of a 50-foot shaft. At a point about 15 feet northeast of the 220-foot crosscut, a 50-foot crosscut was driven N. 25° W. into the hanging wall. Production undetermined. (Brown 16:493; Tucker 29:33; Tucker, Sampson 33:273t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
167	Ellston (Producer) prospect	SW¼ sec. 9, T29S, R31E, MDM, 2 miles south of Hoosier Flat, 5½ miles southwest of Breckenridge Mt.	Undetermined, 1954; R. E. Ellston, Caliente (1949)	Gold-bearing pockets in quartz veins in quartz diorite.	Developed by 80-foot shaft and short drifts. Small production during 1913-1914. Long idle. Aubury 04:14t, 17t; Brown 16:493; Tucker 29:33; Tucker, Sampson 33:273t; Tucker, Sampson, Oakeshott 49:257t).
	Elsy and Groves	Reported near Kern River, 4 miles south of Isabella (old site) (1896); not confirmed, 1957	Undetermined, 1957	Four-foot-wide vertical quartz vein; in granite.	Uncorrelated old name; probably listed herein under different name. Six hundred-foot "tunnel" in 1896. (Crawford 96:189).
	Emerald mine	Reported 4½ miles northeast of Piute (1896); not confirmed, 1958	Undetermined, 1958; J. B. Ferris, Caliente (1896)	Quartz vein in granite; 5 to 7 feet wide; strikes N. 8° W., vertical to 85° S(W?).	Uncorrelated old name. May be listed herein under different name. Probably some production. Developed in 1894 by 200-foot tunnel and 60-foot air shaft. Vein stoped 15 feet below tunnel but water below that level. A 300-foot drain tunnel, 100 foot below stopes, was being driven in 1896. (Crawford 94:143; 96:189).
	Emma	Reported in sec. 7, T26S, R33E, MDM, (1904); not confirmed, 1957	Undetermined, 1957		Uncorrelated old name; may be listed herein under different name (Aubury 04:10t).
	Empire	Reported in NE part of T27S, R31E, MDM (1896); not confirmed, 1957	Undetermined, 1957; F. F. Boettler, Woody (1896)	Eight inch vein strikes NE., dips 45° SE.; in granitic rock.	Uncorrelated old name. Probably abandoned. Developed by 3 shallow shafts and 90 foot of drifts. (Crawford 96:189).
	Enterprise	Reported in T25S, R28E, MDM, on Slate Mt., 5 miles southwest of White River (1896); not confirmed, 1957	Undetermined, 1957; J. A. G. Smith, White River (1896)	Six inch wide quartz vein strikes NE., dips 80° NW.; in mica schist.	Uncorrelated old name. Probably abandoned. Developed by a 50-foot shaft and a 100-foot adit. Formerly described in Tulare County. (Crawford 96:470).
	Esperanza	Reported in sec. 24, T29S, R37E, MDM, El Paso Mts. (1904); not confirmed, 1958; may be in R38E	Undetermined, 1958; S. J. Harker, Garlock (1904)	Quartz veins in granitic rock.	Uncorrelated old name. Probably long abandoned prospect. Developed by 40-foot and 120-foot vertical shafts, 80-foot inclined shaft, and 108-foot horizontal working. (Aubury 04:10t).
168	Esperanza mine	Reported in secs. 5 and 6, T29S, R35E, MDM, east flank of Piute Mt. on northwest side of Kelso Valley (1949); not confirmed, 1957	Undetermined, 1957; Laura N. McFadden, 1310 S. Wilton Pl., Los Angeles (1949)	Quartz vein, 6 inches to 3 feet wide, strikes NW., dips 45° SW., and is in granitic rocks. Tucker and Sampson (1933, p. 301) reported three ore shoots were 40 to 100 feet long, 20 inches wide, and averaged $15 per ton in gold as free gold and auriferous sulfides.	Group consisted of 10 claims in 1933 on which 3 adits were developed. Upper adit (caved) was 350 feet long; 100 feet below was 700-foot adit (caved); and 150 feet below was 170-foot adit with 300-foot drift on vein. Few tens of ounces of gold produced in 1932-35. Idle since then. (Tucker 29:33; Tucker, Sampson 33:273t, 300-301; Tucker, Sampson, Oakeshott 49:257t).
	Eureka claim				Claim in Wegman group. (Tucker, Sampson 40:11, 30; Tucker, Sampson, Oakeshott 49:218, 257t).
	Eureka	Reported 5 miles southwest of Kernville (old site) (1894); not confirmed, 1957	Undetermined, 1957		Uncorrelated old name; probably long abandoned prospect (Crawford 94:143).
	Eva L.	Reported in sec. 27, T28S, R38E, MDM, El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; W. S. Brigham, Randsburg (1904)	Quartz in "porphyry."	Uncorrelated old name. Probably long abandoned prospect. Developed by 50- and 80-foot shafts. (Aubury 04:10t).
	Excelsior claim				Claim in Elephant group. (Aubury 04:10t; Brown 16:493; Julihn, Horton 37:21; Tucker 23:159; Tucker, Sampson 33:273t, 300).
	Exchange prospect	Reported in sec. 11, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; A. J. Loggie, Randsburg (1904)	Placer gold in alluvium.	Worked by dry placer methods in 1890's and early 1900's with low daily yield of gold. Probably listed herein under different name. (Aubury 04:18t; Crawford 96:189, 190t).
	Exposed Treasure mine				See Standard group in text. (Aubury 04:10t, 17t; Brown 16:493, 504-505; Eric 48:255t; Haley 22:46; Julihn, Horton 37:4, 25-27; Newman 23:221, 307; 23b:98; De Kalb 08:310-319; Trask, et. al. 50:84; Trask, Wilson, Simmons 43:123t; Tucker 23:157, 160-161; 29:33-34; Tucker, Sampson 33:273t, 279, 284, 301-302; 34:11; 35:465, 468-469, 474; Tucker, Sampson, Oakeshott 49:218-219, 258t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Extension claim				Claim in Standard group. (Aubury 04:10t; Tucker 23:159-160).
	Extension claim				Former name of claim in Wegman group. (Aubury 04:10t; Tucker, Sampson 40:35, 36).
	Extension Ajax claim				Claim name. See Wegman group. (Aubury 04:10t).
	Extension Karma claim				Claim name. See Wegman group. (Aubury 04:10t).
	Fairmont	Reported in Loraine dist. (1893)	Undetermined, 1958	Ten-foot vein.	Uncorrelated old name. Probably listed herein under another name. (Watts 93:238).
	Fair View	Reported in sec. 34, T27S, R33E, MDM (1904); not confirmed, 1957	Undetermined, 1957; Griffith and Harris, Vaughn (1904)	Quartz vein in granite.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:10t).
	Fairview mine				See Tropico mine (Aubury 04:10t; Brown 16:493; Tucker, Sampson 33:273t; 35:484).
	Fair View	Reported in sec. 21, T28S, R32E, MDM (1904); not confirmed, 1957	Undetermined, 1957; Morning Glory Mining Co., Pasadena (1904)	Quartz in granitic rock.	Uncorrelated old name; probably long abandoned prospect. (Aubury 04:10t; Tucker, Sampson 33:273t).
	Fair View	Reported in sec. 34, T27S, R40E, MDM, Rademacher Dist. (1904); not confirmed, 1957	Undetermined, 1957; Underwood and McNitt, Bakersfield (1904)	Quartz vein in slate and porphyry.	Uncorrelated old name; probably long abandoned prospect. Thirty-foot incline. (Aubury 04:10t).
	Fairy King claim				Former claim of Ashford Mines. (Crawford 96:189).
	Fairy Prince				Former claim of Ashford Mines. (Crawford 96:186).
	Fairy Queen claim				Former claim of Ashford Mines. (Crawford 96:189).
169	Faust prospect	NW¼NW¼ sec. 11, T28S, R33E, MDM, Piute Mts., on southwest side of Bodfish-Claraville Rd., 7½ miles southwest of Bodfish	Undetermined, 1958	Quartz stringers in parallel shears in quartz monzonite. Stringers strike N. 20° E., dip 50° NW.; in zone about 3 feet thick which contains 4 inches of quartz in several stringers mostly in hanging wall side of shear zone.	Developed by 20-foot open cut. Probably no production. An idle prospect.
	Fawn	Vicinity of Vaughn (Bodfish) (1904); not confirmed, 1957	Undetermined, 1957	Quartz vein in granite.	Uncorrelated old name; probably long abandoned. (Aubury 04:10t).
	Fay	Reported in sec. 11, T9N, R13W., SBM, Mojave dist., 3 miles northwest of Rosamond (1904); not confirmed, 1958	Undetermined, 1958; E. M. Hamilton, Rosamond (1904)	One to four-foot vein strikes NE., dips S. in granitic rock.	Uncorrelated old name. Probably now part of Tropico mine. Also see Ann. (Aubury 04:10t).
170	Ferris (Golden, Jack Rabbit) mine	N½ sec. 24, T30S, R32E, MDM, 7 miles east of Caliente, on Caliente Cr.	California Engels Mining Co., Caliente (1949); Ferris millsite is owned by Richard Frasch and Frank Rudnick, Caliente (1958)	Gold- and silver-bearing quartz veins in schist and quartz diorite. A vein occurs on the northeast side of Caliente Creek about 200 feet above the canyon floor. Vein strikes N. 55° W. and dips 70° NE.; schist hanging wall and rhyolitic footwall at collar of shaft. Vein is composed of clayey gouge about 2 feet wide and is locally stained dark blue-gray with manganese and iron oxides. Brecciated quartz occurs in parts of vein still exposed in mine workings. Vein contained silver at surface but at depth of 85 feet silver content decreased, vein widened to 20 feet, and was mined for low-grade gold ore. Other northwest-trending veins were developed on southwest side of Caliente Creek.	Discovered in 1895. Principal development is 220-foot shaft with levels at 65, 110, and 200 feet. The 65-foot level consists of a N. 70° E. crosscut adit driven 80 feet to connect with the shaft and a 60-foot drift extending N. 30° W. from the surface to below the 65-foot level. Horizontal workings on all levels were about 300 feet in total length. A mill was constructed on the southwest side of the creek to treat the ore. Ore from nearby mines probably also treated. Principal mining was between 1897 and 1914. Minor activity 1918-1942. Total output probably several hundred ounces of gold from ore which averaged less than 0.5 oz. gold per ton and an undetermined quantity of silver. Idle since 1942; mill equipment removed. (Aubury 04:11t; Brown 16:495; Crawford 96:189, 605; Tucker 29:35; Tucker, Sampson 33:273t, 304; Tucker, Sampson, Oakeshott 49:258t, 259t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
171	Fine Gold group	Approx. NW¼ sec. 12, T29S, R39E, MDM, near mouth of Goler Cyn., El Paso Mts., 3 miles northeast of Garlock	J. M. Behrens, P.O. Box 272, Randsburg (1958)	Gravels in floor of Goler Cyn. are from 55 to 60 feet deep in center of cyn. and overlie granitic bedrock. Principal nugget-gold zone is near bedrock in sandy and bouldery gravels which range from few inches to 3 feet in thickness. Gold also in gravels in benches along east side of cyn. Average gold content of best gravels ranged from \$5 to \$6 per cubic yard, with some nuggets valued at \$40 (Tucker and Sampson, 1933, p. 302).	Three 20-acre placer claims. Gold was mined from bottom of 61-foot vertical shaft from which about 500 feet of drifts were extended in gravel above bedrock. Gravels on side of cyn. mined from surface pits. Gravels have probably yielded several hundred ounces of gold mined mostly in 1890's and 1930's. Idle since 1938. (Tucker, Sampson 33:273t, 302; Tucker, Sampson, Oakeshott 49:258t).
	Flamiofumes Co. prospect	Reported in sec. 28, T29S, R36E, MDM, Jawbone Cyn. dist.	Undetermined, 1957; The Flamiofumes Co., (1904)	Quartz vein in granite.	Ten shafts 10 to 80 feet deep, minor lateral workings; had 10-stamp mill in 1904. May be former name for Payday or Sidewinder mines, which see. (Aubury 04:10t, 17t).
172	Florence claims	SE¼SW¼ sec. 3, T29S, R38E, MDM, El Paso Mts., at intersection of Bonanza Gulch with Last Chance Cyn.	Cornelius Losey, Glendale (1958)	Gold-bearing Quaternary gravels a few feet thick resting on sedimentary rocks of the Tertiary Goler formation.	Two (?) claims. Develcped by shallow excavations. Probably the source of some gold in 1890's and 1930's. Idle.
	Florence & Bertha	Reported at approx. T25S, R32E, MDM, 3 miles southwest of White River (1930); not confirmed, 1957	Undetermined, 1957; Dan Rickards, White River (1930)		Uncorrelated old name. Probably abandoned. Formerly described in Tulare County. (Franke 30:440).
	Flying Dutchman	Reported in Clear Cr. dist., 4 miles south of Havilah (1896); not confirmed, 1958; may be near Flying Dutchman Cr.	Undetermined, 1958; John Hayes, Havilah (1896)	One foot vein strikes N., dips 80° E.; in granitic rock.	Uncorrelated old name. Probably long abandoned prospect. Originally developed by 150-foot tunnel, 80-foot shaft. (Crawford 96:189).
	Four Jacks	Reported in vicinity of Soledad Mt. (1940); not confirmed, 1958	Undetermined, 1958; Goodwin J. Knight, Los Angeles (1940)	Six-foot quartz vein strikes E, dips 55°-60° S.; in rhyolitic rock. Free-gold and minor sulfides. Silver-gold ratio 15:1 maximum.	Uncorrelated old name. Probably listed herein under another name. Developed by 300-foot shaft with 3 levels. Some production. (Tucker, Sampson 40:30; Tucker, Sampson, Oakeshott 49:258t).
	Four Star Mines group				See Pride of Mojave mine (Eric 48:255t; Julihn, Horton 37:32; Tucker, Sampson 35:474, 475; 40:35, 36).
	Fraction	Sec. 11, T30S, R40E, MDM, south of Randsburg	Undetermined, 1957; B. M. Atkinson, Randsburg (1904)	Two quartz veins, 18 inches wide, strike NE., dip 50° N.,; in schist. Free milling.	Uncorrelated old name; may be property listed herein under different name. Two inclined shafts 30- and 70-foot deep, 200 feet of open cuts, 100 feet of drifts. (Aubury 04:10t).
	Francis H., No.1 claims				Former claims of Yellow Dog mine. Now known as Lakeview and Lakeview No. 1. Tucker 23:163).
	Frank claim				Former claim of Beauregard mine. Now claim in Big Blue group. (Aubury 04:10t; Crawford 94:143; Prout 40:389, 393, 416-417; Tucker 24:39; Tucker, Sampson 33: 320-321).
	Frank and Rey	Reported in sec. 9, T28S, R33E, MDM, Piute Mts. (1904); not confirmed, 1957			Uncorrelated old name. Owned or under least to King Soloman Gold Mng. Co. in 1904. (Aubury 04:10t).
173	Fredle claim	NE¼NW¼ sec. 3, T29S, R38E, MDM, El Paso Mts., 10½ miles northeast of Cantil, in small gulch west of Bonanza Gulch	James D. Fredle, 4540 San Blas Ave., Woodland Hills (1958)	Gold-bearing Quaternary gravels which underlie narrow mesa on west side of Bonanza Bulch. Gravels range in thickness from few feet to at least 20 feet. Gold occurs at base of gravels. Bedrock is sedimentary rocks of Tertiary Goler formation.	One 20-acre placer claim; name undetermined. Probably some production of gold recovered from small-scale dry washing operations in 1890's and 1930's. Long idle.
174	French (Bowman, French Meadows, Trestle) mine	Center SW¼ sec. 29, T28S, R34E, MDM, Piute Mts., east side of French Gulch, 12 miles southeast of Bodfish	A. O. Griswold, Bodfish (1958)	Gold in quartz vein in granitic rock. Vein strikes N. 70° E., dips 70° SE., and ranges in width from 6 inches to 2½ feet. Also pyrite and marcasite. Two main ore shoots developed on vein within 500 feet of portal of main drift. One at 100 feet northeast of portal was 150 feet long and extended to surface. Other at 452 feet from portal was 80 feet long.	Production of several hundred ounces of gold from ore that averaged 1 oz. per ton. Mined mostly in 1906-1907, 1937-1941. A drift adit, 650 feet long driven NE. was caved at 30 feet from portal in 1957. In 1958, a 15-foot winze was being sunk at 30 feet from the portal. Gold ore treated in arrastre formerly, then in 3-stamp mill which is still on property. No production since 1941. (Brown 16:512; Tucker, Sampson 33:272t, 276t, 293; Tucker, Sampson, Oakeshott 49:214, 255t, 268t).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	French Lillies claim				Probably old claim of Glen Olive mine (Aubury 04:10t).
	French Meadows mine				See French mine.
175	Friday Gulch (Friday) mine	Center SW¼ sec. 3, T28S, R32E, MDM, Clear Cr. dist., 3/4 mile northwest of Havilah, ½ mile south of O'Brien Hill	Undetermined, 1958; John Hayes, Havilah (1904)	Two- to 3-foot-wide vein strikes NE., dips 85° SE.; in granitic rock.	Abandoned mine. Originally developed by 150-foot shaft, several hundreds of feet of drifts and crosscuts. Small production. (Aubury 04:10t; Crawford 96:189).
176	Gallup prospect	Midpoint of west boundary of sec. 16, T29S, R34E, MDM, Piute Mts. area, 2 miles south of Claraville, 2/3 mile by dirt road northwest of Gallup Camp	Ed Jones, 6332½ Victoria, Los Angeles 43 (1954)	Quartz stringers several inches wide strike S. 40° W., dip near vertical, through decomposed granitic rock. Veins contain muscovite, limonite, and $16 to $17 per ton in free gold.	Quartz-rich zone explored by 35-foot adit driven S. 40° W., and for about half a mile by shallow, discontinuous surface workings, mostly caved. No known production, long idle.
	Garden City group	Vicinity of Vaughn (Bodfish) (1904); not confirmed, 1957	Undetermined, 1957	Quartz vein.	Uncorrelated old name; may be property listed herein under different name. (Aubury 04:10t).
	Garlock	Reported in sec. 16, T28S, R38E, MDM, El Paso dist. (1904); not confirmed, 1957	Undetermined, 1957; E. T. Garlock, Garlock (1904)	Quartz vein in metamorphic rocks.	Uncorrelated old name; may be property listed herein under different name. In 1904, contained a 200-foot inclined shaft and a 400-foot tunnel (crosscut adit?). On sec. 22, T28S, R40E, MDM, owner had an 8-stamp mill. (Aubury 04:10t, 17t).
	Garnet placer claim	Reported in secs. 17, 18, T11N, R23W, SBM, (1904); not confirmed, 1958	Undetermined, 1958; Western Minerals Co., Pioneer (1904)		Uncorrelated old name. No known production of gold from area in which claims were reported to be. (Aubury 04:18t).
	Garnishee mine				See Keyes mine. (Aubury 04:10t; Brown 16:493; Tucker, Sampson 33:273t, 311-312).
177	Gateway (Lutz) claims	Approx. center sec 17 T29S, R39E, MDM, El Paso Mts., 11¼ miles northeast of Cantil, on east side of mouth of Mesquite Cyn.	Fred Gerbracht and others, c/o Della G. Gerbracht, P.O. Box 346, Randsburg (1958)	Northwest-trending shear zones and quartz stringers parallel to bedding planes in metasedimentary rocks.	Five lode claims. Development undetermined. See also College Girl group under gold. No production. Long idle. (Dibblee, Gay 52:59t).
178	G. B. Mine	Center sec. 1, T30S, R40E, MDM, Stringer dist., 1¼ miles southeast of Randsburg, adjacent to paved county Rd.	Paul J. McCormick, 2615 N. Vermont, Los Angeles (1957)	Gold-bearing vein along fault which strikes N. 20° W. and dips 55° NE. Fault is in Rand schist and extends along surface for about 700 feet. Vein material is brecciated, iron-stained, and silcified schist with free gold and locally scheelite. Width of vein ranges from few inches to several feet. Gold is mostly in shoots in hanging wall of vein which contain closely-spaced fractures. Also along intersections of main fault with nearly horizontal faults in footwall. Most of the ore contains tiny particles of free gold, but richer shoots contain coarse gold. Mined ore averaged 0.3 to 0.5 oz. gold per ton.	One claim. Developed by 4 main shafts and other access shafts, numerous open cuts, and stopes. Deepest shaft is next to road at north end of claim. It extends 260 feet down a 55° incline to the northeast. Most extensive levels are the 85-and 165-foot levels, which have a total of about 1,000 feet of drifts. Extent and location of stopes undetermined but much of surface along vein south of deepest shaft is caved into near-surface stopes. Some stopes were as much as 18 feet wide. Principal mining was during 1896-1910 and 1938-1941. Total production undetermined. Idle since 1948. (Aubury 04:10t; Boalich, Castello 18:13t; Brown 16:493-494; Crawford 96:189; Hess 10:40, 41; Hulin 25:72, 84; Tucker, Sampson 33:273t, 310; 34:315; Tucker Sampson Oakeshott 49:258t).
179	Gem mine	Sec. 5, T28S, R31E, MDM, less than one mile southwest of Democrat Springs	Undetermined, 1958; John Wilson Estate, San Francisco (1933)	One to 4 foot-wide vein strikes northeast, dips 45° SE.; in granitic rock.	Development consists of crosscut-adit driven 650 feet S. 20° E. to vein, with 60-foot drift southwest and 200 feet northeast. At 550 feet from adit a 90-foot raise was driven at 45°. From this point a sublevel was driven 110 feet northeast. An ore shoot was encountered in the sublevel 75 feet from the raise. Ore averaged from $8 to $20 per ton for 45 feet. Another crosscut adit 200 feet above the first was driven 100 feet to the vein where additional ore was mined. (Aubury 04:10t, 17t; Tucker 29:34; Tucker, Sampson 33:302-303, 273t; Tucker, Sampson, Oakeshott 49:258t).
	Gem claim				Claim of Mojave Mining & Milling Co. (Aubury 04:11t).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	General Grant				See Bob Allen. (Crawford 96:470).
	Gilliam and Welch	Reported in sec. 31, T26S, R33E, MDM (1904); not confirmed, 1957	Undetermined, 1957; Gilliam and Welch, Isabella (1904)	Quartz vein in granite.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:11t, 16t).
	Girblick	Reported in sec. 16, T9N, R13W, SBM, Mojave dist., 6 miles west of Rosamond (1904); not confirmed, 1958	Undetermined, 1958; D. Girblick, Rosamond (1904)	Three to 30-foot-wide vein strikes NW., dips SW.; in decomposed granitic rock.	Uncorrelated old name. Probably listed herein under another name. (Aubury 04:11t).
	Gladys claim				Patented claim of Holly Rand mine, which see. (Tucker, Sampson 33:273t).
180	Gladys prospect	NE¼ sec. 11, T29S, R38E, MDM, El Paso Mts., 10½ miles northeast of Cantil	Undetermined, 1958; Frank Curtis, Bakersfield (1952)	An alluvial contact with bedrock along the east edge of a small shallow valley in upper part of Last Chance Cyn.	Uncorrelated name. Probably listed herein under different name. Developed by adit driven NE. along base of gravel, probably in search of placer gold. Adit caved; long idle. (Dibblee, Gay 52:57t).
181	Glen Olive (Bulgarian Troubles)	Approx. center sec. 33, T27S, R33E, MDM, Piute Mts., west side of Bodfish Cr., 5 miles southeast of Bodfish	Bob Frisbee (?), Los Angeles (1955) owns 480 acres of patented land	Two quartz veins about 200 feet apart containing free gold and iron sulfides; in granitic rock. Veins strike NW. and dip NE. Width ranges from 6 inches to 9 feet; average is about 3 feet. Some ore-shoots large and high grade. One was 7 feet wide and averaged $70 in gold. Yielded $325,000 in gold in 28 months in 1880's or 1890's (George Ross, personal communication, 1955). Other shoots averaged $25 per ton (Brown, 1916, p. 494). Veins were called Bulgarian Troubles and Russian Bear veins.	Discovery date undetermined; gold produced by 1914 valued at $500,000 (Brown, 1916, p. 494). Several hundred ounces gold produced between 1917 and 1942 when mine was active every year except 1919, 1924, 1926, 1928, and 1936. Principal workings are two adits 200 feet apart and 700 feet long. Also several hundred feet of horizontal workings, several winzes, and raises. Both adits apparently driven southwest to intersect main veins. Ore lowered on 2-car tramway to millsite in bottom of cyn. Idle since 1940's. (Aubury 04:9t, 15t; Brown 16:494; Crawford 96:189; Tucker 29:34; Tucker, Sampson 33:273t, 280; 40b:327; Tucker, Sampson, Oakeshott 49:258t).
182	Glorietta and Discarded claims	SE¼ sec. 35, T29S, R40E, MDM, in southeast part of town of Randsburg	Chelirene Edmonds and others, address undetermined (1957)	Shear zones in quartz monzonite and Rand schist.	Patented claims. At least two exploratory vertical shafts probably about 100 feet deep. (Tucker, Sampson 33:273t).
	Gold Bag mine				See Gold Bug mine in text. (Tucker, Sampson, Oakeshott 49:258t).
183	Gold Bar prospect	S½NE¼ of sec. 33, T27S, R31E, MDM, on Kern River about one mile northeast of Democrat Springs on the northeast tip of a horseshoe bend in the Kern R.	Mrs. Elizabeth J. Herceg, Los Angeles 114 W. 58 Pl. (1958)	Auriferous Recent gravel. Also contains traces of scheelite.	Intermittent activity since 1934. Produced 1600-1700 cu. yds. of material containing about .05 ounces of gold per cu. yd. Gold-silver ratio 6:1. Idle (Tucker, Sampson, Oakeshott 49:219, 258t).
184	Gold Bug mine	NE¼; NW¼ sec. 34, T27S, R40E, MDM, Rademacher dist., 5 miles south of Ridgecrest	A. De Mayo, P.O. Box 14 Ridgecrest (1957)	Quartz veins in quartz monzonite.	See text. (Aubury 04:11t, 17t; Eric 48:255t; Tucker, Sampson 33:273t, 303-304; Tucker, Sampson, Oakeshott 49:258t).
185	Gold Coin (Stanford) group	SW. cor. sec. 1 and NW. cor. sec. 12, T30S, R40E, MDM, Stringer dist., 1 3/4 miles southeast of Randsburg	George Carr, Bakersfield; leased to Carl E. Stibs, Johannesburg (1957)	Gold and scheelite veins in schist. Veins strike N. 75° E. to N. 30° W. and dip 25°-60° N. Principal vein about 400 feet long on surface; others 50 to 200 feet long. Veins in faults are as much as 4 feet wide at surface; average about 18 inches. Other veins are fraction of inch to 8 inches wide. Ore mined 1898-1916 contained average of 2/3 oz. gold per ton. Scheelite content of vein and placer material erratic. Hess (1910, p. 45) reports some parts of stringers contain more than $120 per ton in gold. Arsenopyrite and pyrite in veins below 100-foot level; sulfides oxidized upwards to surface.	Four patented claims - Gold Coin, Orphan Boy, Stanford, and White Dike. Mined principally 1898-1916, but some activity 1931-1934, 1938-1941, and 1946-1948. Scheelite recovered from alluvium by dry placer methods in 1957. Workings consist of one shaft 425 feet deep and several other shafts of undetermined depth; approximately 2,000 feet of horizontal workings; moderate volume of stoping mostly at depths above 150 feet. Numerous surface pits developed in shallow alluvium. Several thousand ounces of gold produced before 1916; a few tens of ounces produced since then. (Aubury 04:11t, 14t, 15t; Boalich, Castello 18:14t; Brown 16:485; Hess 10:40, 41, 45; Hulin 25:144; Tucker 29:47; Tucker, Sampson 33:276t; Tucker, Sampson, Oakeshott 49:267).
186	Gold Coin claim	Mostly in the extreme eastern part of the NE¼ of sec. 31, T11N, R12W, SBM, Mojave dist., 3 miles southwest of Mojave, west of Standard Hill	Undetermined, 1958; New Tonopah Dividend Mining Co., Tonopah, Nevada (1929)	Shaft collar is in alluvium.	Shaft was sunk with intention of exploring for veins parallel to Yellow Dog vein to the east. (Tucker 23:162; 29:35).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
187	Gold Crown group (Gold King)	NW¼ sec. 12, NE¼ sec. 11, T30S, R40E, MDM, Stringer dist., 2 miles south of Randsburg	Hiram E. Casey (?) Los Angeles (1957)	NE.-to E.-striking gold- and scheelite-bearing stringers in schist. Some schist altered to pale-to dark-colored talc or soapstone strikes N. 5° E., dips 50° W., and crops out in an area a few tens of feet long and several feet wide on nearly level surface.	Three patented claims. Stringers are developed by shafts to a depth of at least 100 feet, and numerous open cuts. Talc or soapstone is exposed in shallow trenches. Undetermined production of gold and scheelite. Idle. (Boalich, Castello 18:13t; Brown 16:494, 522t; Partridge 41:287; Tucker 29:35; Tucker, Sampson 33:273t, 304; Tucker, Sampson, Oakeshott 49:258t).
	Gold Dollar	Reported near summit of "Pah Ute" Mts. (1894); not confirmed, 1958	Undetermined, 1958; Barney Collins, et al, Weldon (1894)	Vertical vein, 10 to 12 inches wide, in slate.	Uncorrelated old name. Probably long abandoned prospect. (Crawford 94:144).
	Golden group				Includes Golden Extension, Ore, Side issue and Southern Golden claims. See Ferris mine.
188	Golden Badger mine	Sec. 12, T29S, R38E, MDM, El Paso Mts., 10½ miles northeast of Cantil	Donald C. Weiss, Clarence D. Weiss, Richard D. Weiss, addresses undetermined (1958)		One lode claim adjoining Copper Chief group, which see under copper. Gold, valued at about $4,000, produced in 1940-1941 by previous owner. (Dibblee, Gay 52:59t).
	Golden Carrier claim				Claim in Standard group. (Aubury 04:11t; Tucker 23:160).
	Golden Cross	Reported in sec. 7, T27S, R33E, MDM, (1904); not confirmed, 1957	Undetermined, 1957; Ed. Palmer, Vaughn (1904)	Quartz vein with arsenic-bearing sulfides in metamorphic rocks.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:11t).
	Golden Cross prospect				See under silver.
	Golden Curry claim				Patented claim of Long Tom mine. (Tucker, Sampson 33:316).
	Golden Eagle	Reported in sec. 12, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermind, 1958; V. C. Brodarson, Randsburg (1904)	Placer gold in alluvium.	Uncorrelated old name. Probably listed herein under different name. (Aubury 04:18t).
	Golden Extension mine				See Ferris mine.
189	Golden Glow prospect	SE¼ sec. 31, T26S, R32E, MDM, Greenhorn dist., 2¼ miles east of Davis Guard Sta.	George Morrison (1957) address undetermined)	Recent stream gravel. Granitic bedrock.	No recorded production. Idle.
	Golden Gulch Nos. 1 to 3 claims				Former claims of Goler Cyn. Placer deposits; now included in Putnam group. (Tucker, Sampson 33:306-307).
190	Golden Oak claim	SW¼NW¼ sec. 3, T27S, R33E, MDM, Piute Mts., on northeast side of Bodfish-Claraville rd., 6 miles southeast of Bodfish	William H. Milton, Bodfish (1958)	Quartz vein, 4 inches thick; strikes N. 10° W., and dips 25° SW. in quartz monzonite.	A prospect on south edge of property of Glen Olive mine. Developed by 25-foot inclined shaft which is only a few feet below the road. Probably no production.
191	Golden Queen (Echo, Gray Eagle, Queen Esther, Silver Queen, Soledad Extension) mine	North central and south central portions sec. 6, T10N, R12W, SBM, Mojave dist., 5 miles southwest of Mojave on the north slope of Soledad Mt.	Dr. Leroy O. Schultz, 527 Kenneth Rd., Glendale (1958)	Quartz veins in intrusive and extrusive rhyolitic volcanic rocks.	See text. (Eric 48:255t; Julian, Horton 37:6, 14-21; Tucker, Sampson 35: 469, 475-479; 40:10-11, 30-31, 33; Tucker, Sampson, Oakeshott 49:220-223, 259t).
	Golden Rule (Robinson)	Vicinity Kernville (old site) (1904); not confirmed, 1957	Undetermined, 1957	Quartz vein.	Uncorrelated old name; may be listed herein under different name. (Aubury 04:11t).
	Golden Rule claim	Sec. 36, T29S, R40E, MDM, vic. Johannesburg		Quartz vein in schist. Free milling.	Developed by a 100-foot incline shaft, a 250-foot tunnel and 300 feet of drifts. See Grannis Land Co. (Aubury 04:11t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
192	Golden Rule prospect	One/eighth mile north of center sec. 20, T29S, R38E, MDM, El Paso Mts., 6 3/4 miles north-north-east of Cantil, a few tens of feet from road in Last Chance Cyn.	Undetermined, 1958; Earl Holloway, Olancha (1952)	Moderately-to well-cemented coarse stream and fanglomerate gravels several feet above the floor of Last Chance Cyn. Gravels are isolated remnants a few tens of feet thick, several tens of feet wide, and several hundred feet long on both sides of the cyn. Workings are mostly along lower few feet of the gravels. Bedrock is quartz diorite. Lower member of Goler formation is source of most of the cobbles and boulders in the gravels.	Developed by benches cut along the canyon side of the gravel beds. Benches have been cut to a depth of about 10 feet and many small pockets were excavated in basal part of the gravels. Probably some production. Long idle. (Dibblee, Gay 52:60).
	Golden Star	Reported in sec. 15, T29S, R39E, MDM, El Paso Mts., (1904); not confirmed, 1958	Undetermined, 1958; Estate of Jo. Monaghan (1904)	Quartz vein in granitic rock.	Uncorrelated old name. Probably long abandoned prospect. Developed by 60-foot inclined shaft, 100 feet of drifts, and a 108-foot tunnel. (Aubury 04:11t).
193	Golden Thorn	$N\frac{1}{2}SW\frac{1}{4}$ sec. 16, T29S, R39E, MDM, El Paso Mts., 3/4 mile northwest of Garlock	Undetermined, 1958; formerly Herman Gowin (deceased)	Faintly copper-stained bedding plane shear in quartzite; strikes N. 25° W., dips 60° NE.	An old prospect developed by an adit driven several tens of feet N. 25° W. Long idle; no production. (Dibblee, Gay 52:59t).
	Golden Treasure	Approx. T25S, R29E, MDM in Chileno (Grizzly?) Gulch, south of White River (1894); not confirmed	Undetermined, 1957; J. Jacombs, White River (1894)	One-foot vein strikes NE., dips 20° SE.; in granitic rock.	Uncorrelated old name. Probably abandoned. Formerly described in Tulare County. (Crawford 94:296).
	Golden Vault claim				Former claim of Goler Cyn. Placer deposit; now included in Putnam group. (Tucker, Sampson 33:306-307).
	Gold Hill mine	Reported 2 miles southwest of Bright Star mine			Probably an older name for the Hilltop mine, which see. (Tucker, Sampson 33: 273t, 304-305; Tucker, Sampson, Oakeshott 49:259t).
	Gold Hill No. 1 and No. 2 claims				Probably part of the Bellflower mine, which see. (Aubury 04:11t).
	Gold Flint prospect	Vicinity Randsburg	Wm. A. Atkinson, Randsburg (1918)		In 1904, had 80-foot shaft and 80-feet of drifts. Listed also as tungsten mine. Last reported in 1918. (Aubury 04:11t; Boalich, Castello 18:12t).
	Gold King	Reported in sec. 27, T27S, R33E, MDM, (1904); not confirmed, 1957	Undetermined, 1957	Quartz vein in granite.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:11t, 17t).
	Gold King	Reported in sec. 9, T29S, R34E, MDM, Piute Mts. (1904); not confirmed, 1958	Undetermined, 1958; C. F. Bennett, Kernville (1904)	Quartz vein in granite.	Uncorrelated old name. May be misstated location of part of Rand group near Havilah. (Aubury 04:11t).
	Gold King	Reported in sec. 32, T11N, R12W, SBM, Mojave dist., 3 miles south of Mojave (1904); not confirmed, 1958	Undetermined, 1958; C. C. Calkins, K. A. Calkins, Mojave (1904)	Six 4 to 7-foot-wide veins strike NW., dip NE.; in porphyry.	Uncorrelated old name. May have been claim in Four Star group. (Aubury 04: 11t).
	Gold King	Reported in sec. 10, T9N, R13W, SBM, Mojave dist., west tip of Tropico Hill (1904); not confirmed, 1958	Undetermined, 1958; Mr. Walters, San Francisco (1904)	One to four foot-wide vein strikes NW., dips SW.; in granitic rock.	Uncorrelated old name. Probably now part of Tropico mine. (Aubury 04:11t).
	Gold King	Reported in sec. 4 (?), T28S, R31E, MDM (1929); not confirmed, 1958	Undetermined, 1958; Charles Ball, Alhambra (1929)		Uncorrelated old name. Probably abandoned. Over 200 ounces of gold recovered 1897-1900. (Tucker 29:35; Tucker, Sampson 33:274t; Tucker, Sampson, Oakeshott 49:259t).
	Gold King group				See Gold Crown group. (Brown 16:494).
194	Gold Nugget claim	$NW\frac{1}{4}SW\frac{1}{4}$ sec. 2, T29S, R39E, MDM, El Paso Mts., $14\frac{1}{2}$ miles northeast of Cantil, on east side of Iron Cyn.	William A. Hubber, 4223 Eagle Rock Blvd., Los Angeles, Ray Bennett, Sun Valley, and Thomas J. Hubber, Lancaster (1958)	Placer gold mostly in gullies downslope from Quaternary terrace gravels. Bedrock is Permian metasedimentary rocks and Paleocene sandstone.	Formerly Livingston claim. Some gold nuggets obtained from gravels in gullies. See also Chamberlain group.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
195	Gold Pass mine	SE¼ sec. 22, NW¼ sec. 26, T27S, R40E, MDM, Rademacher dist., 4 miles south-southeast of Ridgecrest	Undetermined, 1958; F. Reynolds, Randsburg (1933)	Silicified, iron-stained, crushed rock in fault zone that strikes N. 50° E., dips 80° SE. to vertical; in quartz monzonite and rhyolite. A quartz vein about 1 foot thick in quartz monzonite, about 2,000 feet to northwest from fault, strikes N. 40° E., vertical. Quartz vein exposed on surface for several tens of feet and crosses rhyolite dikes. Fault zone extends about 1,000 feet southwest along surface from shaft.	Five claims in 1933; number not determined in 1957. Developed by a 120-foot shaft and a 70-foot drift adit driven southwest along the fault zone from shaft collar. On 60-foot level an 85-foot drift was driven southwest and a stope 20 feet long, 2½ feet wide, and 20 feet high was developed. Quartz vein developed by 8- to 20 foot-wide trench about 100 feet long. A crosscut adit has been driven N. 50° W. about 80 feet below the trench to intersect the quartz vein. Probably minor production. Long idle. (Tucker, Sampson 33:273t, 305; Tucker, Sampson, Oakeshott 49:259t).
196	Gold Peak mine	NE¼ sec. 6, T29S, R36E, MDM, 27 miles north of Mojave, on east side near crest of Gold Peak, in southern Sierra Nevada	Undetermined, 1957; Gold Peak Mines, Ltd., G. A. Karpe, 612 Hellman Bldg., Los Angeles (1933)	Northwest striking, 15°-20° west-dipping vein in granitic rock. Vein is from 6 inches to 4 feet wide and contains free gold and auriferous pyrite.	Developed by several adits, the longest of which is 120 feet. Principal work was done in 1930's; idle since then. Production undetermined. (Tucker, Sampson 33:305-306; Tucker, Sampson, Oakeshott 49:259t).
	Gold Peak mine	Loraine dist.			See under silver.
	Gold Peak and Cowboy mines				See in text under silver.
197	Gold Standard prospect	NW¼NW¼ sec. 19, T28S, R34E, MDM, Piute Mts., on east side of south fork of Erskine Cr., 1 mile southeast of Bright Star mine	Undetermined, 1958; J. E. Moreland, Bodfish, and estate of Mrs. J. H. Potter (1949)	Two quartz veins about 100 feet apart in phyllite; strike N. 70° E., dip 50° SE. Phyllite strikes N., vertical. Quartz veins average about 1 foot in width and contain free gold and chalcopyrite.	Three claims. Several tens of ounces of gold and few hundred pounds of copper mined between 1931 and 1940. Developed by drift adit driven N. 70° E. At 100 feet from portal is 30-foot winze and stope to surface. Drift adit extends several tens of feet farther northeast from the winze but is locally caved. The other vein, north of the main adit, is developed by a 30-foot drift. Idle since 1940. (Eric 48:255t; Tucker, Sampson 40:327; Tucker, Sampson, Oakeshott 49:220, 259t).
	Gold Standard	Reported in sec. 32, T11N, R12W, SBM, Mojave dist., 3 miles south of Mojave (1904); not confirmed, 1958	Undetermined, 1958; C. C. Calkins and K. A. Calkins, Mojave (1904)	Four 1 to 5-foot-wide veins strike NW., dip NE.; in porphyry.	Uncorrelated old name. May have been claim in Four Star group. (Aubury 04:11t; Tucker 33:273t).
	Gold State mine				See Amy mine. (Brown 16:496; Tucker, Sampson 33:272t, 287).
	Gold Zone claim				Former claim of Goler Cyn. Placer deposit; now included in Putnam group. (Tucker, Sampson 33:306-307).
198	Goler Canyon placers	Secs. 1, 2, 3, 10, and 11, T29S, R39E, southeast slope of El Paso Mts., 14 miles northeast of Cantil	Formerly Goler Canyon Mining Co., Inc., Los Angeles (1933)	Gold-bearing gravels in streams and in terrace deposits along southeast flanks of El Paso Mts. and in Goler Cyn., Reed Gulch, and Benson Gulch. Gravels range in thickness from a few feet to few tens of feet, are as much as a quarter of a mile wide and 1 mile long. Principal gold deposits are in lowest beds of gravels and in crevices in bedrocks. Also occurs locally above well-cemented layers of gravel. An estimated 10,000,000 to 15,000,000 cubic yards of gravel contained an average of 68¢ worth of gold per cubic yard (Tucker and Sampson, 1933, p. 306). Nuggets valued at as much as $400 were obtained from test holes made in the gravel in 1933.	Formerly consisted of 20 placer claims comprising 1,500 acres. Claims are included in several other groups of claims; principally the Chamberlain, Janney, and Jewell groups, which see. A pilot washing and sluicing plant was constructed in the 1930's about 1 mile northwest of the mouth of Goler Cyn. Gravels obtained from open pits developed in several of the terrace deposits were tested in the pilot plant. Scarcity of water at local sources was critical problem. Gravels have been source of gold recovered intermittently since 1893 mostly by dry washing methods. Production undetermined. (Tucker, Sampson 33:273t, 279, 281, 306-307; Tucker, Sampson, Oakeshott 49:223, 259t).
	Goler Cons. Placer and Hydraulic Mining Co. properties	Reported in Goler dist., El Paso Mts. (1896), not confirmed, 1958	Undetermined, 1958; Goler Cons. Placer and Hydraulic Mining Co., Los Angeles (1896)	Placer gold in alluvium.	A short-lived consolidation of placer claims which were to be mined by hydraulicing with water from a proposed canal in Owens Valley. Project abandoned in 1896; no production. (Crawford 94:144, 96:190).
	Good Hope (and Kenyon) mine				See Consolidated mines in text. (Aubury 04:11t; Brown 16:496; Tucker, Sampson 33:273t; Tucker, Sampson, Oakeshott 49:259t).
	Good Luck	Reported in sec. 1, T30S, R40E, MDM, vic. Randsburg (1904); not confirmed, 1957	Undetermined, 1957; J. R. Parker, Randsburg (1904)	Quartz vein in granite. Free milling.	Uncorrelated old name. Probably listed herein under different name. Developed by 105-foot vertical shaft, 30-foot open cut, 30 feet of drifts. (Aubury 04:11t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Good Luck mine	Reported in sec. 16, T27S, R29E, MDM, 2 miles south of Granite Station between Adobe Cyn. and Monotti Cr. (1914); not confirmed, 1956	J. B. Williams, Granite Station (1956)	Quartz vein in granite.	Developed by 420-foot adit and 200 feet of drifts. Reported to have yielded ore from a 40-foot-long stope. Ore milled in arrastre. (Brown 16:496; Tucker 29:35; Tucker, Sampson 33:274t; Tucker, Sampson, Oakeshott 49:259t).
	Grace group				Old name. Now part of Wegman group. (Brown 16:497; Tucker 33:274t).
	Grand Prize	Reported in sec. 32, T11N, R12W, SBM, Mojave dist., 3 miles south of Mojave (1904); not confirmed, 1958	Undetermined, 1958; B. Van Briessen, Mojave (1904)	Two 3-foot-wide veins strike NE., dip 65° SE.; in porphyry and granite	Uncorrelated old name. May be listed herein under another name. (Aubury 04:11t).
199	Granite King prospect	NE¼NW¼ sec. 33, T29S, R36E, MDM, at intersection of Kelso Valley - Hoffman Cyn. Road with Butterbread Cyn Road.	Undetermined, 1957; Charles Burch, Mojave (1949)	Poorly-exposed, vertical, north-striking quartz vein in granodiorite Contains free gold.	A caved 60-foot shaft with 60 feet of drifts, and several open cuts. Long idle, production undetermined, mill facilities in Butterbread Cyn. (1934). (Aubury 04:11t; Tucker, Sampson 33:274t, 307; Tucker, Sampson, Oakeshott 49:259t).
	Granite Queen prospect	Sec. 28, T29S, R36E, MDM			See Granite King prospect. (Aubury 04:11t).
200	Grannis Land Co. (includes Golden Rule, Jolly Girl, Juanita W, Terre Marie claims) property	Sec. 36, T29S, R40E, MDM, Johannesburg	John W. Luter, Randsburg (1918) Mostly subdivided for homesites (1957); Several owners	Veins in granite.	Several claim locations which were declared invalid when mineral rights to section were established by court decree to belong to purchaser of the section. See under claim names.
	Grant shaft				A caved 125-foot shaft on a northeast-trending quartz vein south of the Jenette-Grant campsite. See Jenette-Grant mine.
201	Granton (Alfred) mine	SE cor. sec. 4, T30S, R40E, MDM, Rand dist., 2½ miles southwest of Randsburg, on northwest side of Rand Mts.	Arthur P. Garland, Edward Pasich, Ralph McMall, Chet Wood, addresses undetermined (1957)	Several poorly-exposed, irregular to straight shear zones which trend N. 60° W., dip 45° NE.; in schist. Range in width from few inches to about 2 feet and in length from few to several tens of feet.	Formerly Ready Cash. Principal mining activity in 1930's at which time a mill was operated on the property. Previous names undetermined. Developed by several inclined shafts and drift adits near crest of small hill. Probably small output. Long idle.
202	Grapevine prospect	SW¼ sec. 25, T26S, R32E, MDM, Keyes dist., 3 miles north of Bodfish	B. Reid, Bodfish (1957)	Narrow NE.-striking vein in quartz diorite.	No recorded production. Idle.
	Gray Eagle claim				Claim of Golden Queen mine. (Aubury 04:11t; Brown 16: 497; Julihn, Horton 37:(fig. 5); Tucker 23:158-159; 29:31-32; Tucker, Sampson 33:274t, 279-280, 283; 34:315; 35:465, 468, 472-474; 40:33, 34; Tucker, Sampson, Oakeshott 49:259t).
	Gray Eagle Extension claim				Claim of Golden Queen mine. (Tucker 23:158-159; 29:31, 32; Tucker, Sampson 33:282; 35: pl.7).
203	Great Unknown group	Approx. sec. 30, T29S, R37E, MDM, 8 miles north of Cinco	Formerly Mrs. J. S. Bishop, (deceased)	Traces of gold in quartz vein 2 to 6 feet wide, along 100-foot-wide iron-stained quartz-rich porphyritic dike which strikes N. 10° W. in granite.	Abandoned claims. Developed before 1929 by an 80-foot shaft with east and west crosscuts at bottom. (Tucker 29:35; Tucker, Sampson 33:274t; Tucker, Sampson, Oakeshott 49:260t).
	Green	Reported 4 miles south of Isabella (old site) (1896); not confirmed, 1957	Undetermined, 1957	Quartz vein in granite.	Uncorrelated old name; may be listed herein under different name. Developed by 150-foot shaft before 1896. (Crawford 96:190).
204	Greenhorn Caves mine	Secs. 12, 13, 24, T27S, R31E, and sec. 19, T27S, R32E, MDM, about 6 miles west of Bodfish along Greenhorn Cr. on a ridge north of the Kern R.	Undetermined, 1958; H. P. Bradshaw (Bardshaw?) Estate, Los Angeles (1949)	Gold-bearing quartz gravel deposited in open-crevice channel along fault zone, which can be traced several miles. Strikes east and is as much as 500 feet wide. Gold has been found on benches in fault zone.	Developed by a crosscut adit driven 188 feet west to fault and a connecting drift 72 feet northwest. A 100-foot shaft was sunk from a point 450 feet above these workings to a depth of 100 feet and drifts were driven 100 feet southeast and 75 feet northwest. Unconfirmed reports indicate a production of $60,000 in gold and silver, but is probably much less. Recorded production accounts for less than 20 ounces of gold and 5 ounces of silver. Last known activity was in 1940. (Tucker, Sampson 33:307; Tucker, Sampson, Oakeshott 49:223, 260t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Grizzly mine	Reported in sec. 13, T25S, R29E, MDM (1896); not confirmed, 1957	Undetermined, 1957; Blue Mt. Mining Co. (1915), address undetermined	Four inch to 4-foot-wide vein strikes NW., dips 45° SW.	Uncorrelated old name. Probably abandoned. Developed by 150-foot shaft and about 1,000 feet of horizontal workings. Production of over 100 tons of ore averaging 7/10 ounce of gold and 30 ounces of silver. (Aubury 04:11t; Crawford 94:144; 96:190).
	Grizzly Gulch prospect	Reported in sec. 10, T25S, R29E, MDM (1934); not confirmed, 1957	Undetermined, 1957; A. H. Leach, Box 5, Ventura (1936)		Development undetermined. Less than 50 tons produced 1932-1934 averaging 3/4 ounce per ton.
	Grubstake Hill claim				See McKendry group. (Dibblee, Gay 52: 60t; Tucker 29:35-36; Tucker, Sampson 33:274t; Tucker, Sampson, Oakeshott 49:260t).
	Gulch Extension claim				Claim in Standard group. (Tucker 23: 160).
205	Gum Tree mine	E½ sec. 32, T11N, R12W, SBM, Mojave dist., 3 miles south of Mojave on eastern flank of Standard Hill	Undetermined, 1958; Goodwin J. Knight 344 Las Palmas, Los Angeles (1949)	Four to 6-foot-wide vein strikes N. 30° W., dips 60° NE.	Developed by two 200-foot shafts with over 1,000 feet of horizontal workings on 100- and 200-foot levels. Recorded production is over 200 tons which averaged 0.2 oz. of gold and 1.7 oz. of silver. (Tucker, Sampson 40:31, 32; Tucker, Sampson, and Oakeshott 49:260t).
206	Gunderson group (King George, Minnesota)	Approx. center N½ NW¼ sec. 10, T30S, R40E, MDM, Rand dist., 2 miles southwest of Randsburg, at west end of small valley south of Government Pk.	George Hall, R. S. Roher, 1027 E. 7th St., Long Beach (1956)	Gold-bearing brecciated schist in fault zone that strikes N. 25° E., and dips 50-70° NW. Host rock is Rand schist which strikes N. 20° W. and dips about 30° SW. Vein matter is brecciated, iron-stained, and silicified schist from a few inches to one foot or more thick. Fault zone is poorly exposed at surface but can be traced at least 200 feet. At 100 feet east of the westernmost exposure the east half of the fault zone is offset a few feet to the southeast along a crossfault which strikes N. 35° W. and dips 55° NE. The gold occurs free in the hanging wall side of the vein. Most of the gold is in small high-grade streaks. Bulk of ore mined contained 1 to 1.75 oz. gold per ton. Remainder averaged 0.3 to 0.5 oz. per ton.	Five claims. Mine workings consist of 2 main inclined shafts on southwest part of vein and other shafts farther northeast. Also a 44-foot west-driven drift adit, with winze at west end of drift, lies between the two main shafts. Winze connects with drifts of undetermined extent between shafts. Depths of shafts undetermined but 3 shafts were at least 100 feet deep in 1916. Some stopes at surface in east part of vein. Probable total output of few hundred ounces of gold mined mostly 1919-1920 and 1946-1948. Other intermittent mining between 1905 and 1940. Idle since 1948. (Brown 16:503-504).
207	Gwynne (Dead Tree, Jennette, Kern Co. Consolidated Gold Mines; includes Chief, Hard Luck, and Shasta claims) mine	E½ sec. 21 and W½ sec. 22, T29S, R34E, MDM, Piute Mts. area, 3 miles south of Claraville, at end of dirt road	J. C. Geringer estate (1958), Bank of America, Bakersfield, trustee	Gold- and tungsten-bearing quartz veins in granitic rock.	See text. (Aubury 04:9t, 12t, 15t, 17t; Brown 16:498, 499; Crawford 94:146; Jenkins 42:329t; Tucker 29:36, 37; Tucker, Sampson 33:307-309, 274t; 34: 315; 40:11, 32; 41:575-576; Tucker, Sampson, Oakeshott 49:223-224, 257t, 260t, 261t, 273t).
	Gypsy claim				Claim of Golden Queen mine. (Aubury 04:11t; Tucker 23:158; Tucker Sampson 33:282; 35: pl.7).
	Gypsy Lode prospect	W½ sec. 34, T29S, R30E, MDM, 2½ miles north of Bena	Wm. Harmon, address undetermined (1955)	Narrow quartz vein in schist.	Undeveloped prospect. Idle.
	Haeger (Hoegee) claim				See Last Chance mine (Tucker 29:36; Tucker, Sampson and Oakeshott 49:260t).
	Haight	Reported 4 miles east of Havilah (1896); not confirmed, 1958	Undetermined, 1958		Uncorrelated old name. Probably long abandoned prospect. (Crawford 96:190).
	Hamilton mine				See Tropico mine. (Aubury 04:11t, 17t; Brown 16:501).
208	Hanover (A B C) mine	NE¼ sec. 21, T29S, R34E, MDM, Piute Mts., 2 3/4 miles south of Claraville, west side of Gwynne mine Rd.	L. J. Glynn, 10609 S. San Pedro St., Los Angeles (1955)	Gold-bearing quartz vein, 4 to 12 inches wide, strikes N. 70° E., dips 45° SE.; in granitic rock. Reported $40 per ton in gold.	Developed through 150-foot drift adit driven northeast with 100-foot stope above it, also 300-foot crosscut adit driven south to vein, 140 feet below drift adit, with drift 500 feet northeast and 100 feet southwest in vein. Production undetermined. Long idle. (Crawford 94:144; 96:190; Tucker, Sampson 33:274t, 309; Tucker, Sampson, Oakeshott 49:224, 260t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Hardcash claim	SW¼NW¼ sec. 1, T30S, R40E, MDM, Rand dist. in Fiddlers Gulch, 1 mile southeast of Randsburg	Robert G. Mitchell, Randsburg, and Charles Potter, 1662 Sierra Way, San Bernardino (1957)	Iron-stained shear zone in schist strikes N. 85° W., dips 85° NE. in hanging wall of fault zone that strikes N. 60° E., dips 55° SW., and can be traced approx. half a mile to NE. and one mile to SW. Lens of white to pale green clayey material that crops out for 30 feet northeast from the shaft appears to be altered and bleached schist in the hanging wall of the fault. Contains small proportion of tiny grains of sulfides and has been prospected to a limited extent.	Nearly vertical shaft of undetermined depth (50-100 feet ?) and about 20-foot shaft 500 feet to east. Part of California group, which see. No recorded production. Idle.
	Hardcash	Reported in sec. 32, T29S, R40E, Rand dist. (1904); not confirmed, 1957	Undetermined, 1957; Uncle Sam Mining and Milling Co., Los Angeles (1904)	Quartz veins in schist.	Uncorrelated old name; may be property listed herein under different name. (Aubury 04:11t).
	Hard Luck claim				Claim in Gwynne mine. (Tucker, Sampson 33:307-308).
209	Hard Tack prospect	SW¼ sec. 24, T29S, R40E, MDM, Rand dist., 1½ miles northwest of Johannesburg	Undetermined, 1957; Hard Tack Mining Co. (1925)	Rand schist; no mineralization apparent at surface.	Vertical shaft 135 feet deep in schist; 350 feet of horizontal workings at depth of 105 feet. A prospect. No production. Long idle. (Hulin 25:135).
	Hard Tack mine				See Blue Mountain mine. (Brown 16:492; Crawford 96:188, 190).
	Hard Times prospect	Approx. T25S, R29E, MDM, (1894); not confirmed, 1957	Undetermined, 1957; J. Jacombs, White River (1894)	Three to six-inch-wide vein striking generally east, dipping 30° S.	Uncorrelated old name. Probably abandoned. Formerly described in Tulare County. Developed by 70-foot adit and open cut. (Crawford 94:296; 96:470).
	Harley mine	Reported northeast of Kernville (1888); not confirmed, 1957	Undetermined, 1957	Quartz vein in granite.	Uncorrelated old name. Property developed by 900-foot tunnel near crest of a peak; vein worked to depth of 150 feet below level of tunnel. Twenty-stamp mill built in 1877. Idle in 1888 when last reported (Goodyear 88:314).
	Harold G.				Uncorrelated old name; may be part of Commonwealth mine (Aubury 04:11t).
	Haroldson and Sullivan prospect	Reported to be 16 miles northeast of Mojave (vicinity of Cinco?) (1894); not confirmed, 1958	Undetermined, 1958; ___Haroldson, Tehachapi (1894)	Low grade gold ore in granitic rock which was reported to be in a belt about 1,000 feet wide and several thousand feet long.	A long abandoned prospect. No production. (Crawford 94:144).
210	Hart mine	Sec. 13, T30S, R32E, MDM, 7 miles east of Caliente, ¼ mile north of Caliente Cr., on west side of Goldpan Cyn.	Kate Hart, Charles Ganns estate, and others, addresses undetermined (1958)	Quartz vein from 1 foot to a few feet wide strikes N. 80° W. in quartz diorite. Vein is vertical in lowermost workings of mine and dips steeply north or south in upper workings. Walls of vein contain brown iron-stained clayey gouge. In uppermost workings vein feathers out upwards into three stringers each about half an inch wide. Elsewhere the vein appears to occupy a zone of closely spaced fractures.	Developed by a west-driven water-logged lower drift adit 50 feet above floor of Goldpan Cyn. Length undetermined but at least 160 feet long. Three or four other west-driven drift adits, all caved at or near the portals, at approximately 50-foot vertical intervals above the lowermost adit. Caved stopes formerly connected some of these adits. Few hundred ounces of gold produced in 1932-41 from ore which contained less than half an ounce of gold per ton. Idle since 1942.
	Hatchet mine				See Lucky Boy mine (Aubury 04:11t).
	Hattie and Isabella prospect	Near Long Tom mine, 25 miles northeast of Bakersfield (1896); not confirmed, 1958	Undetermined, 1958; L. S. Johnston, Visalia (1896)	Not described.	Probably long-abandoned prospect. (Crawford 96:190).
211	Haunita (Crown Consolidated?) prospect	NW¼ sec. 26, T27S, R40E, MDM, Rademacher dist., 4½ miles south of Ridgecrest	Phillip O. Liebel, Beowawe, Nevada, and Mrs. Fred Risley, address undetermined (1957)	Quartz vein, 6 inches to 3 feet wide in fault zone, 2 to 4 feet wide, which strikes N. 75° E., dips 30° NW.; in granodiorite. Locally heavily stained with iron-oxides and in places near footwall with green copper oxides. Vein crops out for about a quarter of a mile northeast from mine workings.	Developed by drift to southwest at point where vein crosses stream channel and by 3 successively higher short drifts to southwest. Probably minor production of gold. Long idle.
212	Havilah prospect	SE¼ sec. 3, T28S, R32E, MDM, Havilah dist.; few hundred yards west of Havilah on west side of Clear Cr.	Henry G. Miller, address undetermined (1957)	Shear zones about 3 feet wide which strike N. 15° E. and dip 70° - 80° SE.; in fine-grained granitic rocks. Moderately iron stained quartz in clayey gouge in shear zones.	Probably very old workings that have been cleaned up in recent years. Principal open working is 155-foot drift adit S. 15° E. with two crosscuts, about 30 feet long, to the northwest and another drift to the southwest at end of one of the crosscuts. Also caved adits and shafts nearby. Probably no production.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Havilah prospect				See Southern Cross group.
213	Hawkeye mine	SE¼ sec. 1, T30S, R40E, MDM, Stringer dist., 2 miles southeast of Randsburg, at east end of Gold Coin claim	Eleanor Van Zant (1958), c/o H. B. Quick, 32 Orange Ave., Pasadena 33 (1933)	Gold-bearing vein is silicified multiple shear zone in iron-stained schist. Vein strikes N. 30° W., dips 55° NE.; is 6 inches to 4 feet thick. Has well-defined footwall; hanging wall less well-defined. Vein exposed for several tens of feet.	Probably same as Ben Hur extension (see Hulin 1925, p. 129). Developed by inclined shaft of undetermined depth and by drift adits and near-surface stopes along the vein for 75 feet. Production undetermined. Alluvium mined in places for scheelite. Idle. (Crawford 96:191; Tucker, Sampson 33:274t).
	Hector claim				Patented mining claim of King Solomon mine at Johannesburg, which see. (Aubury 04:11t; Crawford 96:191).
	Helen Galvin	Reported in sec. 5, T28S, R31E, MDM, just above Democrat Springs (1933); not confirmed, 1958	Undetermined, 1958; Wm. Nestell, Fred and Helene Burns, 4628 Foreman Ave., No. Hollywood (1933)	Recent auriferous river gravels irregularly distributed on benches and in adjacent canyons.	Uncorrelated old name. Probably abandoned. (Tucker, Sampson 33:309; Tucker, Sampson, Oakeshott 49:260t).
	Hemp Williams mine				See Hanover mine (Crawford 94:144).
	Henrietta	Reported in Loraine dist., vicinity of Loraine (1894)	Undetermined, 1958	One foot to 18 inch-wide quartz vein strikes E.; in granitic rock. Gouge on hanging wall and footwall.	Uncorrelated old name. May be listed herein under another name. Originally developed by three 30-foot shafts and two 100-foot adits. (Crawford 94:144; 96:191).
214	Henry Ford prospect	SE¼ sec. 26, T29S, R34E, MDM, Piute Mts. area, 4 2/3 mi. south of Claraville, on east side of Geringer Grade Rd.	Rudy G. Shellenberger, 6114 Glen Oak, North Hollywood (1954)	Iron-stained gold-bearing vein quartz occurs as discontinuous stringers in deeply weathered granitic rock. Quartz-bearing zone, exposed for about 100 yards, trends N. 25° W.	Exposed in 4 prospect pits, 3 to 6 feet deep, largely caved. No known production, idle.
215	Hercules (Miners Dream) mine	NE. cor. sec. 2, T30S, R40E, MDM, in Fiddlers Gulch, ½ mile southeast of Randsburg postoffice	Charles Allen, U.S. Navy, and J. D. Shea estate, Oklahoma City, Oklahoma (1957)	Siliceous veins along faults in quartz monzonite. Several gold-bearing, iron-stained seams in 4-foot-wide zones of fractured quartz monzonite. Principal vein strikes N. 15° W., dips 55° NE., and is exposed along surface for several hundred feet. Terminated (?) at north end by similar vein which strikes N. 75° W., dips vertically.	Principal vein mined through two shafts about 300 feet apart which are connected with several hundred feet of drifts and stopes on the 300-foot level of the northeast-dipping vein. Only shallow stopes on vertical vein. Mined mostly in 1930's by lessees; ore contained about 2/3 oz. gold per ton. During 1957, a shallow shaft was being developed on the vertical vein by a Mr. Hogan.
	Hidden Treasure	Gordon Gulch, locality undetermined	Undetermined, 1958; C. Biggs, White River (1894)	Placer deposit.	Uncorrelated old name; probably long abandoned prospect. (Crawford 94:45).
216	High Grade (Pennsylvania, Early Sunrise, Sunrise, Ana Isabell) mine	SW¼ sec. 35, T26S, R32E, MDM, Keyes dist., ¼ mile south of old Keysville townsite and ¼ mile northwest of the Mammoth mill	W. H. Whitnall, 6315A Benson St., Huntington Park, E. Schoneman, (address undetermined) (1957)	Two parallel quartz veins which strike about N. 40° E., and dip 70° SE.; in biotite quartz diorite.	See text. (Aubury 04:14t; Tucker 29:45; Tucker, Sampson 33:273t, 322, 323; Tucker, Sampson, Oakeshott 49:265t).
217	Hillside prospect	NE¼ sec. 4, T28S, R40E, MDM, Rademacher dist., 6 miles south of Ridgecrest	Undetermined, 1957	Six-inch-wide, iron-stained quartz vein in quartz monzonite; strikes N. 45° W., dips 40° NE.	Two inclined shafts probably more than 50 feet deep and about 100 feet apart. A prospect, idle.
218	Hilltop prospect	SE¼SW¼ sec. 30, T28S, R34E, MDM, 12 miles southwest of Bodfish on north-trending ridge in Piute Mts.	Lloyd E. McManus, address undetermined (1958)	Quartz vein of undetermined trend in schistose and phylittic metasedimentary rocks.	Claim located in 1939. Developed by 2 shafts about 50 feet apart. South shaft is highest in elevation, about 30 feet deep, and partly caved. North shaft has largest dump and is completely caved to surface. An adit driven S. 40° W. is caved 60 feet from portal in vicinity of north shaft. Idle; no recorded production.
	Hirshfield claim				Patented claim of Long Tom mine. (Tucker, Sampson 33:316).
	Hobson claim				Patented claim of Standard group. (Aubury 04:11t; Tucker, Sampson 23 :160).
	Hoegee claim				See Haeger claim.
	Holly Rand mine				See under tungsten.
219	Homestake prospect	SE¼ sec. 26, T26S, R32E, MDM, Keyes dist., 3 miles north-northwest of Bodfish	Elvira Long, Bodfish (1957)	One-foot vein strikes N. 40° E., dips 70° SE.; in quartz diorite. Vein material consists principally of gouge with free gold, very little quartz. Fault zone is 2½ feet wide.	Development consists of 75 to 85-foot crosscut adit connected to a 100-foot drift and a small stope; a second adit (caved) connected to a shaft (caved). Yielded more than 150 ounces of gold since 1894 from undetermined tonnage of ore. Idle.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Honker	Reported in vicinity of Bodfish; not confirmed	Undetermined, 1958; Sweet Bros., Bakersfield (1904)		Uncorrelated old name. Probably abandoned. (Aubury 04:18t).
220	Hoodoo prospect	NW¼ sec. 34, T27S, R40E, MDM, Rademacher dist., 5½ miles south of Ridgecrest	P. M. Siddens (1957) address undetermined	Quartz vein in fault zone in quartz monzonite. Vein strikes N. 25° W., dips 65° NE., contains 8-to 10-inch width of heavily iron-stained quartz with minor amount of copper oxides.	Developed by 2 shafts about 70 feet apart. Southeast shaft is 50 feet deep, northwest shaft is 80 to 90 feet deep. Idle; probably no production.
	Hope claim				Claim of Elephant group. (Aubury 04:11t; Tucker 23:159; Tucker, Sampson 33:282, 283, 300; 35:468, pl.7).
	Hornspoon claim				Patented claim of Standard group. (Aubury 04:11t).
221	Horoscope claim	SW¼ sec. 28, T27S, R40E, MDM, Rademacher dist., 5 miles south of Ridgecrest	Undetermined, 1958; Barney Sharp (1941) address undetermined	Quartz vein 2 to 6 inches wide in quartz monzonite. Strikes N. 65° W., dips 80° NE., contains iron oxides as stains and incrustations.	Developed by 100-foot or deeper shaft. May be part of Lost Keys group, which see.
222	Hub prospect	Center N½ sec. 4, T31S, R35E, MDM, on ridge on north side of Jawbone Cyn., 16 miles north of Mojave	E. W. Little (1955) address undetermined	Poorly-exposed quartz vein about 2 feet wide strikes N. 10° E., dips 50° E.; in rhyolite.	Shallow shaft and trenches. Five tons mined in 1939 yielded about 1 oz. per ton in gold from a prospect pit; idle since. (Tucker, Sampson, Oakeshott 49:225, 260t).
	Hubbard	Reported 4½ miles northeast of Piute on west side of Emerald claim (1894); not confirmed, 1958	Undetermined, 1958; J. B. Ferris, Caliente (1896)	Quartz vein in granite strikes N. 64° and dips 30° SE.	Uncorrelated old name. May be listed herein under different name. Developed in 1894 by 150-foot tunnel. Idle in 1896. (Crawford 94:145; 96:191).
	Hugh Mann prospect				See Mace prospect (Crawford 94:145).
	Huntington mine				See Bellflower mine. (Tucker, Sampson 33:274t, 309-310; Tucker, Sampson, Oakeshott 49:260t).
223	Iconoclast mine	SE¼SE¼ sec. 25, T27S, R33E, MDM, 7 miles southeast of Bodfish, west side of Erskine Cr., near end of Erskine Cr. Rd.	Mrs. Lillian Miles, 2101 E. Mountain, Pasadena (1954)	Thin bands and lentils of fractured quartz in vein zone 2 to 4 feet wide as exposed in 1954 (12-foot width reported in 1893). Zone strikes N. 50° E., dips nearly vertical in partly talcose sericitic schist and metavolcanic rocks of Carboniferous (?) age. Schistosity strikes N. 50° W., dips 60° SW. Secondary iron oxides and alteration to clayey materials obscures original mineralogy. Values of ores variously reported in previous reports as ranging from few dollars to $250 per ton, largely in silver.	Forty acres patented. Discovered in 1890's but little production before 1916, and intermittent production through 1947. Total production undetermined. Workings include 2 drift adits driven S. 45° W. about 60 feet apart vertically. Lower adit, partly caved and flooded near portal in 1954, was 525 feet long in 1940 with 50-foot winzes 150 and 400 feet from the portal. Upper adit, inaccessible in 1954 because of caving, was 240 feet long in 1940. Some open stopes extend between levels and in places to surface. About 400 tons of ore reported in 1940 to have yielded $15 per ton, mostly in silver, mined from ore shoot 50 feet long about 250 feet from portal of lower adit. (Brown 16:497; Crawford 94:145, 147; 96:198, 605; Tucker 29:36; Tucker, Sampson 33:274t; 40b:327; Tucker, Sampson, Oakeshott 49:261t; Watts 93:237).
	Ida	Reported approx. in T27S, R31E, MDM, (1896); not confirmed, 1957	Undetermined, 1957; F. F. Boettler, Woody (1896)	Twenty-inch vein strikes NE. and dips 45° SE.; in granitic rock.	Uncorrelated old name. Probably abandoned. Developed by a 40-foot and a 75-foot shaft. (Crawford 96:191, 199).
224	Illinois and Golden Bell mine	Approx. center sec. 16, T27S, R33E, MDM, Piute Mts., 3 miles east-southeast of Bodfish, on ridge between Erskine and Bodfish Creeks	Undetermined, 1958; last operated by H. V. Porter, Havilah, about 1927	Quartz vein along west side of north-trending pendant of metamorphic rocks. A pocket of gold ore was mined from a vein 12 inches wide.	An old property. Reported to have yielded gold valued at $12,000 before 1916 (Brown, 1916, p. 497) and probably some ore mined in 1927. Principal working is 300-foot adit. Idle since 1927. (Brown 16:497; Tucker 29:36; Tucker, Sampson 33:274t; 40b:328; Tucker, Sampson, Oakeshott 49:261t).
	Independence claim				Old claim name of Glen Olive mine. (Aubury 04:11t).
225	Independence prospect	SE¼SW¼ sec. 31, T26S, R32E, MDM, Greenhorn dist., 2 miles east of Davis Guard Sta.	W. J. Parmley (1957) address undetermined	Narrow gouge-filled vein strikes NE. in granitic rock.	Short drift adit driven northeast. No stoping evident. No recorded production. Idle.
	Independent claim				Claim of Queen Esther mine (see text under Golden Queen mine). (Aubury 04:11t; Tucker 23:162; Tucker, Sampson 33:282; 35:pl.7).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
226	Indian Queen prospect	Reported in sec. 15, T27S, R29E, MDM, approx. 2 miles south-southeast of Granite Sta. (1949); not confirmed, 1956	J. B. Weringer, Granite Station (1956)	Vein with "granite" hanging wall and "diabase" (?) footwall.	Developed by 80-foot adit and short drifts. Reported to have yielded some high-grade ore prior to 1914. (Brown 16:497; Tucker 29:36; Tucker, Sampson 33:274t; Tucker, Sampson, Oakeshott 49:261t).
	Indian Wells Valley group				See Vera Queen group. (Tucker, Sampson 33:274t, 310; Tucker, Sampson, Oakeshott 49:261t).
	Intention (Intension) claim				Claim in Wegman group. (Tucker 23:16; Tucker, Sampson 33:311).
227	Iriquois prospect	Center sec. 26, T27S, R40E, MDM, Rademacher dist., 5 miles south of Ridgecrest	Al C. Haun (address undetermined 1957)	Quartz vein, one foot or less in width, strikes N. 50° W., dips 70° NE.; in coarse-grained granodiorite. Vein contains small stringers and lenses of oxidized pyrite.	Vein exposed in 20-foot inclined shaft and in an open cut 100 feet to the southeast. A prospect, idle.
	Iron Hat group				See B. Copper and Smith mine under copper. (Tucker, Sampson, Oakeshott 49:225, 261t).
228	Iron Peak (Pyramid) prospect	NE¼NW¼ sec. 2, T28S, R40E, MDM, Rademacher dist., 6½ miles south of Ridgecrest	A. De Mayo, P.O. Box 14, Ridgecrest, and Marvin Harris, P.O. Box 597, Eloy, Arizona (1957)	Multiple shear zone 2 to 10 feet wide in quartz monzonite, strikes N., dips vertically to steeply west. Heavily-iron-stained quartz veins as much as 2 feet thick exposed in 800-foot-long shear zone. Green copper oxides stains in parts of shear zone. Gold is free and mostly in fines in shear zone.	Developed by 90-foot vertical shaft, 15-foot shaft, and several tens of feet of trenches and crosscuts. Only minor production of gold. Idle.
	Isabella				See St. Lawrence Rand mine under silver. (Tucker, Sampson 33:310).
	Isabella Extension (Bevel)	Reported in Long Tom gulch, 23 miles northeast of Bakersfield (1896); not confirmed, 1958	Undetermined, 1958; A. P. Tucker, White River (1896)	Quartz vein, 10 inches wide, dips 45° N. between granite walls.	Uncorrelated old name. Probably long-abandoned prospect. (Crawford 96:186, 191).
	Isian Pk.	Approx. T25S, R29E, MDM, near Grizzly Gulch and Isham Hill (?) (1894); not confirmed, 1957	Undetermined, 1957; G. Dover, White River (1894)	Six-inch to one-foot-wide vein.	Uncorrelated old name. Probably abandoned. Formerly described in Tulare County. Twenty-five-foot shaft. (Crawford 94:297; 96:470).
	Island Mountain group	Reported in sec. 12, T31S, R33E, MDM, Loraine dist., about 4½ miles southeast of Loraine (1904); not confirmed, 1958	Undetermined, 1958; H. C. Jones & Co., Paris, Calif. (1904)		Uncorrelated old name. Probably long abandoned. May be near Nellie's Nipple. (Aubury 04:12t).
229	Jackpot group	NW¼ sec. 34, T27S, R32E, MDM, Clear Cr. dist., 1 mile northwest of Rankin Pk.	Seager (address undetermined) (1957)	Veins in granitic rock.	Comprises 6 claims. Lease held by Earl Johnson, Bodfish (1957).
	Jack Rabbit mine				See Ferris mine. (Brown 16:495; Tucker 29:35, Tucker, Sampson 33:304).
	Jackson	Reported in sec. 17, T28S, R38E, MDM, El Paso dist. (1904); not confirmed, 1957	Undetermined, 1957; Thomas Jackson, Garlock (1904)	Quartz vein in metamorphic rocks.	Uncorrelated old name; may be property listed herein under different name. Developed by 250-foot tunnel (crosscut?). (Aubury 04:12t).
230	Janney placers	Mostly in NW¼ of T29S, R40E, MDM, along southeast flank of El Paso Mts. between townsite of Goler and U.S. Hwy. 395	John Janney, Pioche, Nevada; S. M. Mingus, P.O. Box 94, Randsburg, superintendent (1958)	Quaternary terrace deposits, fanglomerate, and alluvium along north edge of Cantil Valley at southeast edge of El Paso Mts. Includes gravel deposit mined for aggregate and clay in dry-lake bed formed in sag pond along the Garlock fault. Only traces of gold in gravels at surface. Bedrock is probably a minimum of several hundred feet below surface of valley.	Consists of 11 claims comprising 1,360 acres in east group of claims and 6 claims comprising 840 acres in west group of claims. Formerly included 11,200 acres now mostly abandoned or part of other claims. See also Putnam group under gold, Janney deposit under clay, and Triangle Rock Products under sand and gravel. Undetermined production of placer gold 1934-1941, mostly from claims of Putnam group. Idle since 1940's. (Dibblee, Gay 52:60t; Tucker, Sampson, Oakeshott 49:225, 261t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Jeff Davis mine	NE¼ sec. 28, T25S, R33E, MDM, Cove dist., 2 miles southwest of (new) Kernville, west side of Lake Isabella	Kern Development Co., C. S. Long, pres., P.O. Box 157, Hayward. Leased to Kern Mines, Inc., Roland Tognazzini, pres., 260 California St., San Francisco (1955)	Quartz veins in granodiorite and alaskite.	See Big Blue group in text. (Aubury 04:12t; Brown 16:498; Crawford 94:145; Goodyear 88:321; Prout 40:382, 389, 392, 393, 416, 417; Tucker 24:40, 41; 29:36-37; Tucker, Sampson 33:274t, 280; 40b:329; Tucker, Sampson, Oakeshott 49:261t).
231	Jenette-Grant (Jeanette-Grant, Jennette Grant) mine	NW¼ sec. 18, T28S, R34E, MDM, Piute Mts., in tributary to south fork of Erskine Cr. 9½ miles southeast of Bodfish	Della Bergner, pres., Jenette-Grant Mining Co., Mechanicsburg, Pennsylvania (1958)	Quartz veins in metamorphic rocks. Principal exploration has been for northwest extension of Bright Star vein (see under Bright Star mine). Gold associated with several quartz veins prospected on the property, in old Grant shaft, Old Doble shaft, Mayflower shaft, and others. Veins also contain chalcopyrite and pyrite. Stibnite contained in quartz veins along contact between limestone and schist several tens of yards north of main campsite. Most of the veins strike NE. and dip nearly vertically.	Several unpatented claims. Principal development in recent years has been extension of crosscut adit driven S. 60° E. toward Bright Star vein from bottom of cyn. 3,000 ft. northwest of Bright Star mine. Crosscut, started in 1930's, was 950 feet long in 1958. Some traces of sphalerite, pyrite, arsenopyrite, and gold in fractures in limestone walls of crosscut. Stibnite adit, few hundred feet north of crosscut adit portal, is 70 feet long. Antimony ore valued at $13,000 shipped in 1918 (Tucker, Sampson, and Oakeshott, 1949, p. 226) and 2,750 lbs. containing 33.5 percent antimony sold to Harshaw Chem. Co. in 1943-1944 (N. C. Anderson, personal communication, 1955). About 1 ton of ore containing 11 percent of copper shipped in 1943 (N. C. Anderson, personal communication, 1955). Probably some production of gold from older workings south of campsite. (Tucker, Sampson 40b:328; Tucker, Sampson, Oakeshott 49:207, 225-226, 252t, 261t).
	Jenette (Jeanette) mine				See Gwynne mine in text. (Aubury 04:12t, 17t; Brown 16:498; Crawford 94:145, 146; 96:191; Tucker 29:37; Tucker, Sampson 33:274t, 307-308; 40:32; Tucker, Sampson, Oakeshott 49:224, 261t).
	Jennie Lind claim				Former claim of Ashford Mines, which see. (Aubury 04:12t).
232	Jerry mine	Center of S½ sec. 34, T27S, and NE¼ sec. 3, T28S, R40E, MDM, Rademacher dist., 6 miles south of Ridgecrest	Marvin Harris, P.O. Box 597, Eloy, Arizona (1957)	Quartz veins in poorly exposed shear zone in quartz monzonite; strike N. 30° W., dip 60° NE. Shear zone is from 3 to 18 inches wide with quartz veins along hanging wall and footwall. Principal vein strikes N. 35° W., dips 75° NE., and is in hanging wall of shear zone along a diorite dike. Vein is 2 to 3 inches thick but near main shaft is as much as 8 feet thick.	Developed by a 125-foot main shaft and an 84-foot shaft 75 feet to the northwest. A drift connects the shafts on the 60-foot level and extends 60 feet southeast of the main shaft. Twenty-foot drifts have been extended northwest and southeast from the main shaft on the 120-foot level. Mr. Harris states that about $12,000 in gold has been produced from the mine. Idle.
233	Jerry prospect	Northeasternmost corner of sec. 9, T29S, R34E, MDM, Piute Mts. area, ½ mile southeast of Claraville, about ¼ mile west of Geringer Grade Rd.	Laura M. Thomas, 4541½ Melbourne Ave., Los Angeles (1954)	Quartz-filled sheeted zone 2 to 3 feet wide strikes N. 60° E., dips 60° SE.; in deeply weathered granitic rock.	Explored by 35-foot adit driven N. 60° E., and by 75-foot adit, southwest of above opening, driven S. 15° W. along clay-filled shear planes in massive decomposed granite. No stopes or known production; long idle.
234	Jeweler Hill mine	SE¼ sec. 35, T28S, R40E, MDM, Summit dist., 4-3/4 miles northeast of Randsburg, Summit Range	Edward and Maudena Van Sant, Elizabeth McGlohn, address undetermined (1958)	See description of Summit Diggings Placer mines.	
235	Jewell group (Chief assistant, Cunningham group, Eagle Roost, Stardust, part of Goler Cyn. placer group, and other claims)	Mostly in sec. 2 and west part of sec. 1, T29S, R39E, MDM, El Paso Mts., on both sides of Goler Cyn., 15 miles northeast of Cantil	Kathleen M. Jewell, Randsburg (1958)	Gold-bearing terrace and stream gravels along Goler Cyn. and lode deposits in Paleozoic metasedimentary rocks. Gravels worked for gold are 1,000 feet long, 200 feet wide, and an average of 7 feet deep. Average value in gold reported to be 68¢ cu. yd. (Tucker, Sampson, and Oakeshott 1949, p. 217-218) with nuggets ranging in value from 50¢ to $400 each. Fault zone trending N. 10° E. in metasedimentary rocks contains thin stringers of manganese oxides in fault gouge. Also strong vein reported to contain gold along fault striking N. 30° W. and dipping 50° NE. in metavolcanic rocks in center of sec. 2.	About 25 placer and lode claims. Probably some production of lode gold from vein in center of sec. 2. Developed by 150-foot northwest-trending drift adit 100-foot inclined shaft 30 feet north of portal of drift, and 30-foot vertical shaft at portal of drift adit. Drift adit contains short stopes 2½ to 4 feet wide northwest of incline. Many shallow drifts and shafts elsewhere on property and numerous excavations in gravels. Principal source of gold from gravels appears to be on southwest side of Goler Cyn. near mouth of an east-draining gulch. Production of placer gold during 1930-1934 valued at least at $1,500 (Tucker, Sampson, and Oakeshott, 1949, p. 218). Probably much larger yield of gold prior to 1930. Idle since 1930's. (Dibblee, Gay 52:59t, 60t, 61t; Tucker, Sampson 33:306-307; Tucker, Sampson, Oakeshott 49:217-218, 256t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Jim Crow claim	Sec. 35, T29S, R40E, MDM, in center of Randsburg	E. B. Maginnis, Randsburg (1933)		Patented mining claim which underlies part of town of Randsburg. (Tucker, Sampson 33:274t).
	Joe Morina mine				See Esperanza mine. (Tucker 29:33).
236	Joe Walker mine	Mostly in the E½ sec. 12, T29S, R32 E, MDM, in the northern part of Walker Basin, 1 3/4 miles northwest of Johns Pk.	Undetermined, 1958; J. B. Haggin and Phoebe Hearst Estates, New York (1949) Vern Schell Ranch (?)	Two to 20 foot-wide vein strikes N. 45° E., dips 60° SE.; in granitic rock.	See text (Aubury 04:12t; Goodyear 88: 317, 318; Tucker, Sampson 33:274t, 279, 280, 310-311).
	John L.	Reported in sec. 20, T28S, R40E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; J. C. McKinney Randsburg (1904)	Quartz vein with sulfides in "slate and porphyry".	Uncorrelated old name; may be listed herein under different name. Developed by 1904 by 150-foot incline, 250 feet of drifts and 150-foot tunnel (crosscut ?). (Aubury 04:12t).
	Joker	Reported in sec. 21, T27S, R40E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; Underwood and McNitt, Bakersfield (1904)	Quartz vein in "slate and porphyry"	Uncorrelated old name; may be listed herein under different name. One 40-foot and one 60-foot inclined shaft. (Aubury 04:12t).
	Jolly Girl	Sec. 36, T29S, R40E, MDM, Johannesburg (1904); not confirmed, 1957	Undetermined, 1957; Simes and Co., Randsburg (1904)	Quartz vein in schist.	One 40-foot vertical shaft, 60-foot incline shaft, 25 feet of drifts. See Grannis Land Co. (Aubury 04:12t).
	Josephine mine	Reported in secs. 2, 3, 4, 5, 8, T25S, R29E, MDM, 5 miles southeast of White River (1916); not confirmed, 1957	Undetermined, 1957; W. Adams, Corinth, Miss. (1916)	Six parallel quartz veins, maximum width of 8 feet, strike NE. dip 45° SE.	Development consists of several thousand feet of horizontal workings. No recorded production. Brown 16:498; Crawford 94:145; 96:191; Tucker 29:37; Tucker, Sampson 33:274t; Tucker, Sampson, Oakeshott 49:261t).
	Josephine prospect	Reported in sec. 34, T27S, R33E, MDM, Piute Mts., 5½ miles southeast of Bodfish (1949); not confirmed, 1958	Undetermined, 1958; Tom Smith, Bodfish (1949)	Quartz vein, 6 to 18 inches wide; in granite; strikes N. 10° W. and dips 40° NE. Vein locally has visible free gold and high grade pockets.	Two claims in 1949; 3 claims in 1940. May be listed herein under different name and location. Developed by approximately 100 feet of horizontal workings in 2 adits. Small production likely. (Tucker, Sampson 40b:328; Tucker, Sampson, Oakeshott 49:226, 261t).
	Josephine claim				Patented claim of Long Tom mine. (Tucker, Sampson 33:311).
	Josephine T.G.				See Culbert group. (Brown 16:498-499).
237	Juan Dosie (Juan Dosia, Jann Dosie) mine	Sec. 2, T30S, R33E, MDM, Loraine dist. 3½ miles northeast of Loraine on the east side of Sand Cyn.	Tom Davies (?), Caliente (1958)	One to 4 foot-wide vein strikes E., dips 60° N.; in granitic rock. Vein has been traced 1,200 feet on surface. Consists mostly of quartz. Two rhyolitic dikes in the area form the walls of the vein at some points. Ore shoot on 70 level is 50 feet long, 70 feet high, and 1 to 2 feet wide; on 200 level an ore shoot is 50 feet long, 100 feet high, and 1 to 2 feet wide.	Discovered by McKay & Struther in 1889. Developed by 220-foot shaft with levels at 80, 100, 150, and 200 feet; 70-foot shaft; and 135-foot adit. Few hundred feet of horizontal workings. Estimated total production is 2,000 to 2,500 tons of ore containing an average of 0.5 to 0.75 oz. gold per ton. Long idle. (Aubury 04:12t; Crawford 94:145; 96:191, 199; Tucker, Sampson 33:274t; Tucker, Sampson, Oakeshott 49:262t; Watts 93:238).
	Juanita W. claim	Sec. 36, T29S, R40E, MDM, vic. Johannesburg	Undetermined, 1957; J. R. Parker Randsburg (1904)	Quartz vein, 10 inches wide, strikes E., dips N.; in granitic rock. Free milling.	Four inclined shafts 40 to 100 feet deep, 90 feet of drifts. See Grannis Land Co. (Aubury 04:12t).
238	Judy Ann prospect	SE¼SE¼ sec. 6, T29S, R40E, 6½ miles northwest of Randsburg, on east side of small cyn. on southeast flank of El Paso Mts.	E. W. Groves, address undetermined (1958)	Brecciated quartz containing pockets of hydrous iron oxides and gypsum in fine-grained dioritic rock. Quartz is a lens 10 feet wide, 30 feet long, and at least 20 feet deep in shear zone trending NW. An assay made by owner showed $8 in gold.	Developed by 10-foot adit across quartz lens and 20-foot open cut along the lens. Minor excavations in several quartz stringers in immediate area. A prospect; no production; idle.
	Julius Shades				Uncorrelated old name; may be property listed herein under different name. (Hulin 25:135-136).
	Jumbo mine	Reported in sec. 35, T27S, R40E, MDM, Rademacher dist.	Undetermined, 1957; F. A. Huntington, San Francisco (1904)		Probably former claim at Bellflower mine, which see. (Aubury 04:12t).
	Jumbo group				Group of 3 claims in Goler dist. abandoned since 1952 (Dibblee, Gay 52:59t; Tucker, Sampson, Oakeshott 49:226-227, 262t).
	Junction claim				Claim in Wegman group. (Tucker 23:161; Tucker, Sampson 33:311).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Karma mine				See Wegman group. (Aubury 04:12t, 17t; Brown 16:497, 499; Julihn, Horton 37:22; Tucker 23:161; 29:37; Tucker, Sampson 33:274t, 279-280, 282, 283, 311; 35:465, 468, 479-480, pl. 7; 40:34-35; Tucker, Sampson, Oakeshott 49:227, 262t).
	Kate Hayes	Reported in sec. 21, T28S, R32E, MDM, (1904); not confirmed, 1958	Undetermined, 1958; Morning Glory Mining Co., Pasadena (1904)	Quartz in granite.	Uncorrelated old name; probably long abandoned prospect. (Aubury 04:12t).
	Katie	Reported in sec. 32, T11N, R12W, SBM, Mojave dist., vicinity of Standard Hill (1904); not confirmed, 1958	Undetermined, 1958; Calkins, and Potter, Los Angeles (1904)	Quartz veins in volcanic and granitic rock.	Uncorrelated old name. Probably listed herein under another name. (Aubury 04:12t).
	Katydid claims				Eleven placer claims formerly part of Goler Canyon Placers group. (Tucker, Sampson 33:306-307).
	K.C.N. claim				Name of patented claim of St. Lawrence Rand mine. (Tucker, Sampson 33:310).
239	Kelso Creek placers	Sec. 16, T28S, R35E, MDM, Sageland dist., near townsite of Sageland	Andrew Miller, Sageland (1933)	Recent stream gravels from 10 to 30 feet thick and 150 feet wide resting on granitic bedrock. Mostly fine gold, but some coarse pieces reported, presumably derived from gold quartz veins in Piute Mts.	A short-lived attempt was made in 1932 or 1933 to recover the gold by separating fines through revolving screens then passing through sluices. Average gold value of gravels was reported to be 50¢ per cubic yard (Tucker, Sampson, 1933, p. 311). Scarcity of water resulted in shutdown. (Tucker, Sampson 33:311; Tucker, Sampson, Oakeshott 49:266t).
	Kenneth B. Fraction claim				Claim of Big Gold mine, which see. (Tucker 23:166; Tucker, Sampson 33:291).
	Kentucky, The	Reported in sec. 2, T29S, R31E, MDM, (1904); not confirmed, 1958	Undetermined, 1958; Tupman and Munger, Bakersfield (1904)	Quartz vein in granite.	Uncorrelated old name; probably long abandoned prospect. (Aubury 04:12t).
	Kenyon mine				See Consolidated mines in text. (Crawford 96:188, 191; Hulin 25:80).
	Kern County Consolidated Gold Mines				See Gwynne mine (Brown 16:499).
	Kernville mine				Old name; now part of Big Blue group. (Aubury 04:12t).
240	Keyes (Old Keyes, Garnishee) mine	S½SW¼ sec. 26 and N½NW¼ sec 35, T26S, R32E, MDM, about 2,000 feet N.30°W., of the old Keysville townsite	Mrs. Ivie Copelin, Keysville (1957)	One-to 2½-foot quartz vein strikes N. 45° E., dips 70° SE.; in Mesozoic quartz diorite. Principal ore shoot was mined about 250 feet along strike near the main level and 450 feet along the rake to the surface. The ore body raked about 60° NE.	Discovered 1852 by Col. Keyes. Active intermittently until 1938. Total production $450,000. Since 1900, produced ore valued at over $200,000. Most ore averaged 2 ounces per ton. Development consists of a main level crosscut-adit driven 840 feet west to the vein and a 1,400-foot drift and numerous winzes, raises, and sublevels (see fig. in text). Ore was milled in a 5-stamp mill on the property. (Aubury 04:12t; Brown 16:483, 499-500; Crawford 94:145; 96:191; Tucker 20:34; 21:310; 29:37-38; Tucker, Sampson 33:274t, 278, 280, 311, 312; 40:32, 33; Tucker, Sampson Oakeshott 49:262t).
241	Keyesville Mines placers	NE¼ of sec. 35, T26S, R32E, MDM, Keysville dist., 2 miles northwest of Isabella, on the flat, ¼ mile northeast of old Keysville	A. B. Coe, Box 662, Isabella (1957)	Auriferous Recent stream gravels in intermittent streams.	Worked by simple panning methods during periods when streams are running. No recorded production.
	Keyesville Placer	Reported in sec. 36, T26S, R32E, MDM, Keyes dist., east of old Keysville (1919); not confirmed, 1958	Undetermined, 1957; G. Henschkel, Isabella (1919)	Abandoned river channel trending NW. with about 10 to 15 feet of loose, poorly sorted gravel. Bedrock is Isabella granodiorite.	Probably old name. Production history limited to period 1894-1919, when more than 600 ounces gold were recovered. (Brown 16:500).
	King George group				See Gunderson group (Brown 16:503).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
242	Kings prospect	NE¼ sec. 2, T28S, R40E, MDM, Rademacher dist., 6½ miles south of Ridgecrest	Marvin Harris, P.O. Box 597, Eloy, Arizona (1957)	Quartz vein, 18 inches wide, with pyrite, strikes N. 40° W., vertical; in quartz monzonite. Vein poorly-exposed on surface and probably of short lateral extent.	A prospect. Developed by 10-foot shaft. Idle.
243	King Solomon (Ashford) mine	NE¼SW¼ sec. 36, T29S, R40E, MDM, Rand dist., half a mile east of Randsburg, on north slope of Rand Mts.	Shipsey Mining Co., Alban Walton, pres., 600 Mound Ave., South Pasadena (1958)	Gold-bearing veins in Rand schist.	See text. (Aubury 04: 10t, 11t, 12t, 13t; Brown 16:500; Crawford 96:186, 188, 189, 191, 193, 195, 197; Eric 48:255t; Hulin 25:80, 81, 88, 136-137; Tucker 21:310; 24:191; 29:38; 34:315; Tucker, Sampson 33:274t, 280, 310, 313-314; 40:11, 33; Tucker, Sampson, Oakeshott 49:227, 262t).
244	King Solomon (Pleasant View) mine	NW¼ sec. 18, T28S, R33E, MDM, Clear Cr. dist., 3 miles east of Havilah, on south side of King Solomon Ridge	Richard Aston, Liston Arbro, (address undetermined) (1955)	Free gold in quartz vein in granitic rock.	See text. (Aubury 04:12t; Brown 16:500; Tucker 33:274t, 312, 313; 40b:328, 329; 49:262t).
	King Solomon	Reported in sec. 25 T27S, R40E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; Underwood and McNitt, Bakersfield (1904)	Quartz vein in granite.	Uncorrelated old name; may be listed herein under different name. Developed by 30-foot open cut. (Aubury 04:12t).
	Kinyon mine				See Consolidated mine in text. (Aubury 04:12t).
	Kinyou mine				See Consolidated mine in text. (Aubury 04:17t).
	Kirner	Reported approx. secs. 25, 26, 35, 36, T26S, R32E, MDM, (1904); not confirmed, 1957	Undetermined, 1957; Thomas Kirner Keyes (1904)	One-foot vein strikes NE., dips SE.; in granitic rock.	Uncorrelated old name. Probably abandoned. Developed by 65-foot and 300-foot adits. (Aubury 04:12t).
245	Klondike group (Bond Buyer, Cash Register, Voss Consolidated, Placer mines)	SE¼ sec. 1, T30S, R37E, MDM, southeast flank of El Paso Mts., 3 miles north-northeast of Cantil	M. D. and Cora F. Blanvelt, Sacramento (1958)	Placer deposits of gold in stream gravels and fanglomerate on southeast flank of El Paso Mts. and gold mineralization along several northwest-trending shear zones in metasedimentary and igneous rocks. Unconfirmed reports of recovery of gold nuggets weighing several ounces. Value of gold in gravels reported to average 30¢ to $2 per cubic yard (Tucker, 1929, p. 51). NW.-trending shear zones dip 45°-70° SW., are from few inches to 2 feet thick, and are exposed on surface for several tens of feet. Most of exploratory work has been done on iron-stained quartz lenses and stringers in the shear zones.	Several claims. Probably includes part of former Orange Blossom group (see under copper). Placer ground developed by several pits, shafts, and open cuts. Shear zones developed by short adits, shallow shafts, and open cuts. Probably some production of placer gold in 1890's. Names of claims at that time undetermined. No production from lode deposits. Long idle. (Dibblee, Gay 52:61t; Tucker 29:51; Tucker, Sampson 33:276t, 293-294; Tucker, Sampson, Oakeshott 49:255t, 269t).
	Kootenai claim				Patented claim of King Solomon mine at Johannesburg, which see. (Aubury 04: 12t).
246	La Crosse prospect	NE¼ sec. 11, T30S, R40E, MDM, Stringer dist., 1 3/4 miles south-southeast of Randsburg, southeast slope of Rand Mts.	Anna M. Osborn, address undetermined (1957)	Gold-bearing quartz vein strikes N. 30° W., vertical; in schist. Average width 2 to 6 inches; maximum of 20 inches. Gold occurs free in quartz and with arsenopyrite.	One claim. Developed by several shafts from 20 to about 100 feet deep and about 400 feet of drifts. Output of several hundred ounces of gold in 1909 from ore that contained about 3½ ounces gold per ton. Minor production in 1937. Long idle. (Aubury 04:12t; Brown 16: 500; Tucker 29:39; Tucker, Sampson 33:274t; Tucker, Sampson, Oakeshott 49:262t).
	Ladd prospect	Reported in sec. 36, T11N, R12W, SBM, Mojave dist., 3 miles due east of Standard Hill on northeast slope of small butte (1949); not confirmed, 1958	Undetermined, 1958; O. H. Ladd, Mojave (1949)	Series of northeast-striking fractures, 6 to 8 inches wide; in rhyolitic rock. Rhyolitic rock strikes east, dips 60° N. On the south side of butte, 2 parallel 4-foot quartz veins strike east, dip steeply north.	Developed by 100-foot trench, 6 feet deep, several smaller trenches, and a 35-foot shaft with 25-foot crosscut north. Assays of veins and fractures average $3.00-$4.00 per ton in gold. (Tucker, Sampson, Oakeshott 49:227, 262t).
	Lady Belle	N½ sec. 28, T25S, R33E, MDM, Cove dist., 2 miles southwest of (new) Kernville, west side of Lake Isabella	Kern Development Co., C. S. Long, pres., Box 157, Hayward. Leased to Kern Mines, Inc., Roland Toggnazzini, pres., 260 California St., San Francisco (1955)	Quartz veins in granodiorite and alaskite.	See Big Blue group in text. (Aubury 04:12t; Brown 16:501; Crawford 94:145, 147; Prout 40:382, 389, 392, 416, 419; Tucker 24: 35, 40-41, 42; 29:30; Tucker, Sampson 33:274t, 280; 40:28; 40b:329; Tucker, Sampson, Oakeshott 49:262t).
	Lady Langtry claim				Patented claim of Long Tom mine. (Tucker, Sampson 33:316).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Lass, Archer E.	Sec. 33, T29S, R40E, MDM, Rand dist., 2 miles west of Randsburg	Undetermined, 1957; Bouchard and Hansen, Randsburg (1904)	Quartz vein, 6 feet wide, strikes NE., dips SE.; in granitic rock and metamorphic rock.	Uncorrelated old name; may be property listed herein under different name. One 40-foot shaft, 50 feet open cuts, 30 feet drifts. (Aubury 04:12t).
247	Last Chance (Nymph and Last Chance, Haeger, Hoegee) mine	NE¼ sec. 15, T9N, R13W, SBM, Mojave dist., on southwest flank of Tropico Hill, 4½ miles northwest of Rosamond	Undetermined, 1958; W. H. Haeger, 4639 Prospect Ave., Los Angeles (1949)	Four-foot vein strikes east, dips 60° S.; in rhyolitic rocks.	230-foot shaft, couple hundred feet of drifts; produced 100-200 tons containing .3 oz. gold per ton. (Tucker 29:36; Tucker, Sampson 33:275t; Tucker, Sampson and Oakeshott 49:260t).
	Last Chance claim				Formerly part of Yellow Aster mine. Part of California and Hardcash group. (Aubury 04:12t).
	Last Chance claim				Formerly claim of Exposed Treasure and Desert Queen mines. See Standard group. (Aubury 04:12t; Tucker 23:160).
	Last Chance	Reported in secs. 4, 5, T29S, R38E, MDM, El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; S. J. Harker, Garlock (1904)	Placer gold in alluvium.	Uncorrelated old name. Probably listed herein under different name. (Aubury 04:18t).
248	Latham Tunnel prospect	NW¼ sec. 23, T27S, R32E, MDM, 3½ miles north of Havilah on Hooper Hill	Undetermined, 1957	Barren granodiorite.	Six hundred-foot adit driven N.30° W. in 1908. No production.
249	Laurel mine	SW¼NE¼ sec. 26, T27S, R33E, MDM, 1 mile west of Erskine Cr., 6 miles southeast of Bodfish	Undetermined, 1955; John Hooper, Hobo Hot Springs (1949)	Fault contact between limestone and metavolcanic rocks of Carboniferous (?) age strikes northwest and dips steeply northeast. Brecciated and gouge-filled fault zone, reported to be as much as 12 feet wide, contains quartz, pyrite, chalcopyrite, and sphalerite with values of $7 in gold and 4 ounces of silver per ton, and 2 percent copper.	Six unpatented claims (Perth Amboy 1, 2, 3, and Marble 1, 2, and 3) in 1949). Developed by two addits about 90 feet apart vertically. Lower adit driven west 100 feet from which point two branches about 70 feet long were driven (caved in 1955). One driven S. 30° W. with 80-foot raise to connect with 45-foot shaft and 130-foot crosscut; one driven N. 80° W. with 70-foot raise and 130-foot crosscut. Upper adit driven 40 feet N. 60° W. then 50 feet N. 30°W. Winze at turning point filled below 4 feet in 1955. Ore carried on aerial tramway to mill (now dismantled) at base of hill. Mining periods and production undetermined. Long idle. (Tucker, Sampson 33:274t, 314-315; 40b:329-330; Tucker, Sampson, Oakeshott 49:263t).
250	Lehigh Valley group	SW¼NW¼ sec. 29, T27S, R40E, MDM, Rademacher dist., 5 miles south-southwest of Ridgecrest	Undetermined, 1957; P. R. and J. B. Light, C. F. Walker, Maxwell Orr, Inyokern (1933)	Free gold and pyrite in quartz veins that strike N. 70° E., dip 60° NW.; in crushed granitic rock. A 6-inch-wide quartz vein is along the footwall of a 6-foot-wide fault zone. A parallel quartz vein 6 inches to 2 feet wide, occurs along a felsitic dike 50 feet to the north. Both veins are poorly exposed and several tens of feet long.	Developed by three shallow shafts with short drifts along south vein. North vein prospected by shallow trenches. A 15-foot-wide arrastre was constructed in 1933 to recover gold from ore that contained from $15 to $25 in gold per ton. Long idle. (Tucker, Sampson 33:274t, 310; Tucker, Sampson, Oakeshott 49:261t).
	Liberty claim				Former claim of Yellow Dog Extension mine. (Tucker 23:164).
	Lida mine				See Tropico mine (Aubury 04:12t; Brown 16:501; Tucker 29:39, 50; Tucker, Sampson 33:274t; Tucker, Sampson, Oakeshott 49:263t).
	Lillian				Uncorrelated old name; may be part of Commonwealth mine (Aubury 04:12t).
	Little Angel mine				See Warrington mine. (Aubury 04:16t, 17t; Crawford 94:148; Crawford 96:197; Tucker, Sampson 33:333; Tucker, Sampson, Oakeshott 49:269t; Watts 93:238).
251	Little Audrey prospect	Center S½ sec. 28, T27S, R40E, MDM, Rademacher dist., 5 miles south of Ridgecrest	Arthur Savage, address undetermined (1957)	Iron-stained shear zone along northeast wall of a vertical diorite dike that strikes N. 50° W.	A prospect developed by a vertical shaft about 100 feet deep. Idle.
	Little Blue	Reported in NW¼ of T27S, R32E, MDM, west of Bodfish (1896); not confirmed, 1958	Undetermined, 1958; Charles Hitchcock, Woody (1896)	Eight-inch-wide quartz vein in granitic rock.	Uncorrelated old name. Probably abandoned prospect. (Crawford 96:192).
	Little Bonanza claim				Patented fraction claim of Yellow Aster mine. (Aubury 04:12t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Little Bonanza	Reported in SW¼ sec. 35, T26S, R32E, MDM, adjoining Mammoth mine in Keyes dist., (1916); not confirmed, 1957	Undetermined, 1957; A. R. Lucy, Isabella (1916)	Narrow vein in granitic rock.	Uncorrelated old name. Developed by 140-foot tunnel. (Aubury 04:12t; Brown 16:501, 502; Tucker 29:39; Tucker, Sampson 40:330; Tucker, Sampson, Oakeshott 49:263t).
252	Little Butte mine	East side sec. 35, T29S, R40E, MDM, north side of town of Randsburg	Undetermined, 1958; Little Butte Mng. & Mlg. Co., J. W. Oakley, pres., 2249 S. Hobart, Los Angeles (1949)	Two siliceous veins along faults along dioritic dike in Rand schist. Free fine-grained gold in silicified and iron-stained brecciated schist with quartz stringers. Little Butte vein strikes N. 70° W., dips 60° NE., and extends to the southeast through Kenyon, Butte, and King Solomon mines. Another vein strikes N. 40° W., dips 50° NE., from intersection with Little Butte vein near east boundary of property. Fine-grained sulfides found on 600-foot level. Value of ore quoted in previous reports range from $6 to more than $250 per ton in gold. High values sporadic.	Three patented claims. Principal shaft inclined 60° NE. and 610 feet deep with about 3,500 feet of drifts on levels spaced at 50-foot intervals. Shorter shafts and manways to surface east of the main shaft. Principal periods of productivity were between 1897 and 1902, and during 1905-1906. Estimated values of total gold output range from $150,000 to $400,000. Idle since 1923. (Aubury 04:12t, 17t; Brown 16:502; Crawford 96:192; Hulin 25:80, 137; Tucker, Sampson 33:274t, 280, 315; Tucker, Sampson, Oakeshott 49:263t).
	Little Charlie group				See Croesus group.
	Little Jim	Reported in NW¼ sec. 22, T30S, R33E, MDM, Loraine dist., ½ mile northeast of Loraine on a southwest slope facing Caliente Cr. (1894); not confirmed, 1958	Undetermined, 1958	Narrow vein strikes N. 30° W. and dips steeply NE.; in schist.	Uncorrelated old name. Probably in the southwest part of the Amalie mine property. (Crawford 94:146).
253	Little Jimmy prospect	Sec. 1, T30S, R37E, MDM, Redrock Cyn.	Undetermined, 1958; Formerly Mrs. J. S. Bishop, (deceased)		Prospect; abandoned by Bishop family. (Dibblee, Gay 52:59t).
254	Little Joe mine	NW¼NW¼ sec. 5, T29S, R34E, MDM, Piute Mts. area, 1½ miles west of Claraville, about ¼ mile south of George Lodge	Gerald R. Atkins, P.O. Box 12, Claraville (1955)	Two sub-parallel gold-bearing quartz veins, 6 to 18 inches wide, strike N. 70° E., dip 70° SE.; in deeply-weathered granitic rock. Ore reported to average $25 per ton in gold.	Developed by 40-foot crosscut adit driven north to vein, with drift 350 feet northeast on vein; connects with 76-foot shaft, 200 feet northeast of portal. Also several shafts 40 to 50 feet deep sunk 200 feet west of portal of crosscut adit. Two-stamp mill active 1933, inoperable in 1955. Production, if any, undetermined; long idle. (Tucker, Sampson 33:274t, 316; Tucker, Sampson, Oakeshott 49:263t).
	Little Nugget	Reported in sec. 18, T28S, R39E, MDM, El Paso dist., (1904); not confirmed, 1957	Undetermined, 1957; Balch and Fletcher, Randsburg (1904)	Quartz vein in metamorphic rocks.	Uncorrelated old name; may be property listed herein under different name. Developed by 100-foot inclined shaft and 350-foot tunnel. (Aubury 04:13t).
	Little Wanderer	Reported in sec. 36, T27S, R40E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; Underwood and McNitt, Bakersfield (1904)	Quartz vein in granite.	Uncorrelated old name; may be property listed herein under different name. Two 40-foot inclined shafts and a 25-foot open cut. (Aubury 04:13t).
	Locarno mine			Gold- and tungsten-bearing quartz veins in granitic rock.	See under tungsten.
	Lodestar (Lodestar Mining Co.) mine	W½ sec. 6, T10N, R12W, SBM, Mojave dist., on northwest slope of Soledad Mt.	(See Remarks)		The southeastern part of this group is now a part of the Golden Queen group; the remainder is included in the Elephant group (Julihn, Horton 37: 19, fig. 5; Tucker, Sampson 40:10, 11, 31, 33).
	London	Reported in sec. 7, T28S, R40E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; Mr. Hogaastrath, Salem, Wisconsin (1904)	Quartz vein with pyrite in granite.	Uncorrelated old name; may be property listed herein under different name. Two inclined shafts, 40 feet and 50 feet deep, 100-foot vertical shaft, 30 feet of open cuts, and 75-foot tunnel (crosscut?). Description of workings resembles that of Wildcat mine, which see. (Aubury 04:13t).
255	Lone Star prospect	SW¼ sec. 21, NW¼ sec. 28, T29S, R36E, MDM, Butterbread Cyn., 10½ miles northwest of Cinco	Charles and Elizabeth Larbig, address undetermined (1957)	Poorly-exposed quartz stringer strikes N. 65° W., dips 50° NE.; in quartz diorite.	Old inclined shaft probably about 70 feet deep. A two-stamp mill with gravity table and cyanide tanks is adjacent to the road in Butterbread Cyn. half a mile south of the mine. Long idle.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
256	Lone Star (includes Evening Star and North Star) group	NE¼ sec. 18, T28S, R34E, MDM, Piute Mts., 10 miles southeast of Bodfish	J. E. and Mattie Moreland, Claraville (1958)	Quartz veins in fine-grained metamorphic rocks. Veins contain free gold, pyrite, and arsenopyrite. Lone Star vein strikes N. 70° E. and dips 55° SE. Average width is 3 feet; reported to average $25 to $40 in gold (Tucker, Sampson, and Oakeshott, 1949, p. 228). Two ore shoots 60 feet apart on 100 level of Lone Star vein; one is 70 feet long - other is 60 feet long. Other veins from few to several hundred feet northwest and southeast of Lone Star vein but less well-developed.	Several claims (9?) on east side of Bright Star and Jenette-Grant claims. Lone Star shaft inclined SE. 100 feet with 200-foot drift southwest and 70-foot drift northeast at bottom (?). Two oreshoots on southwest drift stoped to 50-foot level. Other veins developed by shallow shafts now mostly caved. Total production undetermined. Production in 1896-1898, 1912-1913, 1940-1948, and intermittently in 1930's. Idle since 1948. Mill used for tungsten ore in 1950's. See photo in text. (Tucker, Sampson 40:330-331; Tucker, Sampson, Oakeshott 49:228-229, 263t).
257	Long Tom mine	NW¼ sec. 26, NE¼ sec. 27, T27S, R29E, MDM, 4½ miles south by southeast of Granite Station on Pine Mt. Cr.	F. C. Record, Granite Station (1956)	Vein in granitic rock.	See text. (Brown 16:502; Tucker 29:39; Tucker, Sampson 33:275, 316, 317; Tucker, Sampson, Oakeshott 49:263t; Watts 93:238).
	Lookout	Reported in sec. 3, T29S, R39E, MDM, Goler dist., El Paso Mts., (1904); not confirmed, 1958	Undetermined, 1958; A.Marty, address undetermined (1904)	Two quartz veins in metamorphic rocks.	Uncorrelated old name. Probably long abandoned prospect. Developed about 1904 by shallow shafts and an open cut. No production. (Aubury 04:13t).
	Lookout	Reported in Goler dist., El Paso Mts. (1896); not confirmed, 1958	Undetermined, 1958; Alfred Heath, Randsburg (1896)	Placer gold in alluvium.	Uncorrelated old name. Worked by dry placer methods in 1890's with low daily yield in gold. May be listed herein under different name. (Crawford 96:190t, 192).
	Loretta	Reported in sec. 3, T28S, R32E, MDM, Clear Cr. dist., northwest of Havilah (1904); not confirmed, 1958	Undetermined, 1958; John Hayes, Havilah (1904)	Vein, one to 2 feet wide, strikes NE., dips SE.; in granitic rock.	Uncorrelated old name. Probably listed herein under another name. (Aubury 04: 13t).
	Los Angeles Placer Mining Co. property	Reported in Red Rock dist., El Paso Mts. (1896); not confirmed, 1958	Undetermined, 1958; Jeff Johns and others, Red Rock (1896)	Placer gold in alluvium.	Uncorrelated old name. Worked by dry placer methods in 1890's with low daily yield in gold. May be listed herein under different name. (Crawford 96:192, 195t).
	Lost Cabin mine				See Castle Butte mine.
258	Lost Keys prospect	SW¼ sec. 27, SE¼ sec. 28, T27S, R40E, MDM, Rademacher dist., 5 miles south of Ridgecrest	Undetermined, 1958; D. J. O'Connor, M. L. Ruppert, Walter A. Grosse, addresses undetermined (1933)	Quartz vein with free gold and pyrite strikes N. 60° W., dips 80° NE.; in shear zone in granodiorite. Vein is few inches to 3 feet thick and poorly exposed. North- and northeast-striking dioritic dikes crop out nearby and probably intersect the vein.	Principal development work is a shaft 105 feet deep from which 40 tons of ore reported (Tucker 1933, p. 317) to average $20 per ton in gold was mined about 1933. Idle. See Horoscope claim. (Tucker, Sampson 33:275t, 317; Tucker, Sampson, Oakeshott 49:263t).
259	Lucky Boy mine	NW¼NE¼ sec. 11, T30S, R40E, MDM, Rand dist., 1½ miles south of Randsburg	W. C. Wilkenson, Johannesburg (1957)	Two veins in faults or shear zones a few tens of feet apart strike approximately west, dip 45° N. and 65° S. Exposed discontinuously along surface for about half a mile. Veins range in thickness from few inches to 2½ feet. Most ore shoots mined were maximum of few tens of feet long. Gold occurs free in quartz and silicified crushed schist in fault zones.	Five claims. Six shafts inclined approximately 55° to north, 3 vertical shafts, and open cuts. Shafts range from 50 to 185 feet in depth with drifts as long as 250 feet. Principal mining done 1899-1902, 1928, 1937-1941, and 1946-1947. Most recent work is at east end of property in inclined shaft. Production is reported to be valued at $120,000 (Tucker 29:31). Two men working part time in 1957. (Aubury 04:9t, 17t; Hulin 25:25, 132; Tucker 23:171; 29:30-31; Tucker, Sampson 33:272t; Tucker, Sampson, Oakeshott 49:229, 255t, 263t).
	Lucky Joe and Sullivan	Reported at head of Caliente Cr., 4 miles northeast of Piute (1896); not confirmed, 1958	Undetermined, 1958; W. J. Thornton, et al, Piute (1896)	Large vein of quartz.	Uncorrelated old name. Probably long abandoned prospect. (Crawford 96:192, 199t).
	Lucky Strike claim				Claim of Big Gold mine. (Tucker 23:166).
	Lutz claims				See Gateway claims (Dibblee, Gay 52:59t).
260	Mabel S claim	NE¼ sec. 2, T30S, R40E, MDM, Rand dist., half a mile south of Randsburg	Anna Asher, address undetermined (1957)	Shear zone in quartz monzonite.	Patented fraction. Minor production about 1902. Long idle. (Aubury 04:13t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
261	Mace (Hugh Mann) prospect	SE¼SW¼ sec. 22, T29S, R34E, MDM, Piute Mts. area, 3½ miles south of Claraville	Robert Resh, 273 E. Alegria, Sierra Madre (1959)	Quartz vein strikes N. 50° E., dips 75° SE. in shear zone; in deeply-weathered granitic rock.	Explored by 85-foot drift adit driven northeast with 30-foot winze about 25 feet from portal. Production undetermined. Idle. (Crawford 94:145, 146; 96:192-193; Tucker, Sampson 33:307).
	Maceo	Reported in sec. 34, T28S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; A. Marty, Garlock (1904)	Quartz veins in quartzite.	Uncorrelated old name. Probably long abandoned prospect. (Aubury 04:13t).
	Magnolia prospect				See under tungsten.
	Magpie claim				Patented mining claim of King Solomon mine at Johannesburg. (Aubury 04:13t; Crawford 96:193).
262	Maltby Placer	Sec. 15 T25S, R29E, MDM, 4 miles north by northwest of Woody, 3/4 mile southeast of Isham Hill	J. Maltby, Woody (1956)	Auriferous gravel in old channel. Gravel bed 150 to 350 feet wide and four to six feet thick has been prospected for 1,300 feet along its length. It is covered by a two to six-foot-thick mantle of soil and lies on granitic bed rock.	Active intermittently since 1894. Last active 1941. Ore was handled by power shovel and trucked to nearby mill. More than 1,500 cubic yards have been mined which averaged .024 ounce per gold cubic yard. (Tucker, Sampson 33:275t, 317; Tucker, Sampson, Oakeshott 49:263t).
	Mamie	Reported approx. secs. 25, 26, 35, 36, T26S, R32E, MDM, Keyes dist., (1896); not confirmed, 1957	Undetermined, 1957; Mrs. Ross, Kernville (1896)	Six inch quartz vein strikes N., dips 85°E.; in granitic rock.	Uncorrelated old name. Probably abandoned. Development consists of 60-foot shaft and 300-foot adit. (Crawford 94:146; 96:193).
263	Mammoth mine	NW¼SE¼ of sec. 35, T26S, R32E, MDM, ½ mile southwest of old Keysville	Rudnik Estate Trust, P.O. Box 5481, Bakersfield (1957)	Two parallel quartz veins in granodiorite; strike N.40°E., dip 70°E.	See text. (Aubury 04:13t, Brown 16:502, 503; Crawford 94:146; 96:193; Goodyear 88:314; Tucker 29:40, 41; Tucker, Sampson 33:275t, 278, 280, 317-319, 326, 327; Tucker, Sampson, Oakeshott 49:263t).
	Mammoth (Sovereign)	Reported 1 mile west of Havilah, Clear Cr. dist. (1896); not confirmed, 1958	Undetermined, 1958; Max Helmes, et al, Havilah (1896)		Uncorrelated old name. Probably listed herein under another name. (Crawford 96:193).
	Mammouth	Reported in sec. 5, T10N, R12W, SBM, Mojave dist. (1904) not confirmed, 1958	Undetermined, 1958; Reed & Crowe, Mojave (1904)	Four-foot quartz vein strikes N., dips E.; in porphyry.	Uncorrelated old name. Probably described herein under another name. (Aubury 04:13t).
	Manzanita group	Reported in sec. 31, T30S, R34E, MDM, Loraine dist. (1904); not confirmed, 1958	Undetermined, 1958; H. C. Jones & Co., Paris, Calif. (1904)		Uncorrelated old name. Probably long abandoned. (Aubury 04:13t).
	Margurette Russell (Marguerite Russell) prospect	Reported in sec. 16, T28S, R32E, MDM, Clear Cr. dist., 2 miles southwest of Havilah (1904); not confirmed, 1958	Harold Wright, Los Angeles (1957)	Six inch to 2-foot-wide vein strikes E., dips S.; in granitic rock.	No recorded production. (Aubury 04:13t; Crawford 96:193).
	Maria	Fiddler Gulch, 1 mile east of Randsburg	Benson Bros., et. al., Randsburg, (1896)	Ten inch to 24 inch quartz vein dips 40° S.	Uncorrelated old name. Last reported in 1896; may be listed herein under different name. Developed by 40-foot inclined shaft. (Crawford 96:193).
	Mariposa claim				Patented claim of Yellow Aster mine. (Crawford 96:193, 194).
264	Mary Ellen prospect	NE¼ sec. 22, T29S, R34E, MDM, Piute Mts. area, 3 miles south of Claraville, just east of Geringer Grade Rd., about ¼ mile south of junction with Gallup Camp Rd.	Wm. Pajanew, P.O. Box 2, Mojave (1954)	Quartz-rich brecciated and altered rock about 4 feet wide strikes N. 25° W., dips nearly vertically; in deeply weathered granitic rock. Hematite and pyrite occur disseminated in drusy quartz and granitic rock, with traces of gold and silver.	Explored by 30-foot adit driven S. 25° E. Zone of gouged-material 50 yards east of above working explored by 10-foot adit. No known production. Idle.
	Mascot claim	Reported in sec. 33, T27S, R33E, MDM (1904); not confirmed, 1958	Undetermined, 1958	Quartz vein in granite.	Claim of Glen Olive Mng. Co. in 1904. (Aubury 04:13t).
	Mascot prospect	Reported five miles southwest of Randsburg (1916); not confirmed, 1957	Undetermined, 1957; G. M. Humphrey, Randsburg (1916)	Small vein of high grade ore in schist.	Uncorrelated old name. A 50-foot shaft and short drift. Ore milled at Red Dog mill in Johannesburg. Minor production. May be same as Sidewinder prospect. (Brown 16:503).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Mastedon	Reported in sec. 3, T28S, R32E, MDM, Clear Cr. dist., northwest of Havilah (1904); not confirmed, 1958	Undetermined, 1958; Warrington Mining, Milling Co., Minneapolis, Minn. (1904)	Five-foot vein strikes N.; in granitic rock.	Uncorrelated old name. May be part of Warrington mine. (Aubury 04:13t).
265	Master Key group	N½ sec. 1, T30S, R40E, MDM, Rand dist., 1 mile southeast of Randsburg	Charles Brown, San Bernardino, Irene W. Brown, Randsburg, and Jean Smith Klatz, address undetermined (1957)	Quartz veins, 1 to 3 feet wide, strike NE.; in rhyolite and quartz monzonite. Mined and sorted ore from veins reported to contain $50 in gold per ton (Tucker and Sampson, 1940, p. 34).	Five claims and fractions. Developed by 4 shafts. Two shafts are 25 feet deep, two are 50 feet deep. A drift 60 feet in length connects the two 50-foot shafts. In previous reports total production reported to be $4,000 or $5,000 in gold. Idle since 1942 (Tucker, Sampson 40:34; Tucker, Sampson, Oakeshott 49:229, 264t).
	Matilda	Reported in sec. 31, T26S, R33E, MDM (1904); not confirmed, 1957	Undetermined, 1957; Baker and Moore, Kernville (1904)	Quartz vein in porphyritic rock.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:13t).
	Mattie				Former claim of Lucky Boy mine. (Aubury 04:13t).
266	Mayflower mine	Center E½ sec. 6, T27S, R32E, MDM, Greenhorn dist., 2 miles south of Woodward Pk.	Evelyn Wyman (1957) address undetermined	Ten-inch quartz vein strikes N., dips 40° E.; in granitic rock.	Known as early as 1896. Known production limited to 1896-1897 when more than 800 ounces of gold was mined from undetermined tonnage. Idle. (Aubury 04:13t; Crawford 96:193).
	Mayflower mine	Loraine dist.			See Minnehaha mine in text under tungsten
	Mayflower gulch	Reported 7 miles northwest of Havilah (1896); not confirmed, 1958	Undetermined, 1958; F. F. Boettler, Woody (1896)	Gold-bearing stream gravel 18 inches to 2 feet thick.	Uncorrelated old name. Worked by groundsluicing in 1896. Probably long abandoned. (Crawford 96:193).
	McBrayer (McBryer) claim				Former claim of Silver Queen mine. (Aubury 04:13t; Tucker 23:162; 35:465; Tucker, Sampson 34:316).
	McClellan	Reported on Green Mts., 7 miles northwest of Havilah (1896); not confirmed, 1958	Undetermined, 1958; C. C. Stockton, Bakersfield (1896)	Quartz vein in granite; 24 inches wide; dips 45° S.	Uncorrelated old name. May be listed herein under different name. Developed in 1896 by 2 shafts, 80 feet and 45 feet deep, and a 140-foot tunnel. Production undetermined. (Crawford 96:193, 199t).
	Mc Gowan	Reported in sec. 12, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958	Placer gold in alluvium.	Uncorrelated old name. Probably listed herein under different name. (Aubury 04:18t).
	McKeadney (McKidney) mine				See Porter Group in text. (Aubury 04:13t; Brown 16:503; Crawford 96:193; Tucker, Sampson 29:41; 33:275t, 299-300; Tucker, Sampson, Oakeshott 49:264t).
267	McKendry (includes Daly and Grubstake Hill claims) group	SW¼ sec. 8, NW¼ sec. 17, T29S, R38E, MDM, El Paso Mts., 8 miles north-northeast of Cantil	E. S. McKendry and Pancho Barnes, P.O. Box 37, Cantil (1958)	Gold-bearing stream gravels. Gravels overlie lower members of Ricardo formation (Pliocene) which were probably the source of part of the gold and pebbles in the gravel. At Grubstake Hill, ¼ mile north of the old Cudahy Camp, gravel is few tens of feet above floor of Last Chance Cyn. and several feet thick. A flat-lying bed of poorly-cemented pebbly sand containing thin layers rich in black sands appears to have been the principal source of gold. It is 6 inches thick and is exposed for about 300 feet in north and east side of Grubstake Hill. Tucker (1929, p. 35-36) reported the pay gravel was from bedrock to height of 3 feet above and reported to contain from 30 cents to $2 per cubic yard in very fine gold.	Fourteen 20-acre placer claims. Principal mining done from short drifts into gravel near crest of Grubstake Hill. Drifts extend west into east side of Grubstake Hill and south into north side. Drifts range in length from 10 to 50 feet and are spaced at intervals of 10 to 50 feet. Minedmaterial was sorted at northeast tip of hill, probably with dry screens, and gold recovered by wet methods. Workings of Daly claims consist of 4 east-driven adits and a southeast-driven inclined shaft on the east slope of Last Chance Cyn., half a mile north of Grubstake Hill. Workings are in sandy beds of Ricardo formation, andesite, and stream gravel. Estimated few hundred ounces of gold produced from Grubstake Hill, probably in 1920's and 1930's. Idle. (Dibblee, Gay 52:60t; Tucker 29: 35-36; Tucker, Sampson 33:274t; Tucker, Sampson, Oakeshott 49:260t).
	Medie Lode	Sec. 2, T30S, R40E, MDM, Rand dist., south of Randsburg	Undetermined, 1957; Arthur Asher, 601 Transportation Bldg., Los Angeles (1933)		Uncorrelated old name; may be property listed herein under different name. (Tucker, Sampson 33:275t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
268	Merced mine	SE¼ sec. 11, T30S, R40E, MDM, Stringer dist., 2 miles south of Randsburg	Mrs. T. S. Barnhart, address undetermined (1957)	Two extensively mined quartz stringers that contain gold and scheelite on south part of claim. Stringers strike approximately west, dip steeply to north; in schist. Stringers are several feet apart probably a few inches in average width. They extend east into Pearl (Victory) Wedge claim and west into Winnie mine. Probably about 1,000 feet long.	One patented claim. Principal gold mining in 1905-1908, 1910-1912, and 1933-1936. Total gold output is several hundred ounces from ore that averaged ½ oz. to 2/3 oz. per ton. Tungsten output undetermined but probably few hundred units. Developed by 10 shafts on south part of claim to maximum depth of at least 300 feet and a few thousand feet of horizontal workings. Stopes extend to surface along large part of the stringers. Lesser workings on north part of claim. Mined by several lessees and small mining companies. (Aubury 04:13t).
	Mesa prospect	Reported in gravel wash below Goler Cyn., Goler dist., El Paso Mts. (1894); not confirmed, 1958	Undetermined, 1958; D. C. Kuffel and others, Randsburg (1896)	Gold bearing gravel from Goler Cyn.	Gravels prospected by sinking a 367-foot shaft, but water encountered before reaching bedrock. No production. Probably included in property of other mines listed herein. (Crawford 96:193).
	Meteor	Reported in sec. 33, T29S, R40E, MDM, Rand dist., 2 miles west of Randsburg (1904); not confirmed, 1958	Undetermined, 1957	Two 3-foot-wide quartz veins, strike N. dip E.; in schist. Free milling.	Uncorrelated old name; may be property listed herein under different name. (Aubury 04:13t).
269	Middle Butte (Rosamond clay, Trent) mine	SW¼ sec. 16, T10N, R13W, SBM, Mojave dist., 9 miles northwest of Rosamond on the southeast tip of Middle Butte	Middle Butte Mine, Inc., c/o Emory L. Morris Mary Johnson, San Francisco (1958)	Six to 25-foot-wide vein strikes N. 28 W., dips 50° NE.; in quartz latite porphyry.	See text. (Julihn, Horton 37:4, 32, 33; Tucker 35:467, 481; Tucker, Sampson, Oakeshott 49:229-230, 264t; Walker, Lovering, Stephens 56:17).
270	Miles prospect	SE¼ sec. 4, T31S, R36E, MDM, east end of Antimony Flat, 5 miles west of Cinco	T. F. Miles, 172 E. Main St., Ventura (1957)	Quartz vein in rhyolite and granodiorite contains fine-grained sulfides and gold. Strikes N. 20° W., dips 50° NE.	Developed by two shallow shafts and several prospect pits; probably no production. Two men working part time in 1955.
	Miller group				See Summit Diggins Placer mines. (Tucker, Sampson 33:322).
271	Milwaukee prospect	NW¼ sec. 16, T9N, R13W, SBM, Mojave dist., on the southwestern base of Willow Springs Mt.	Mr. Masterson, c/o "X" Motel, Lancaster (1958)	Several weak veins strike east, dip 60° S. in quartz monzonite and along bedding planes of overlying pyroclastic sediments. Vein structure is weak, difficult to trace on the surface. Tenor of exposed vein apparently was low.	Developed by 3 shafts: 85-foot vertical, 310-foot vertical, and 250-foot inclined. The 310-foot shaft has a 250-foot crosscut north on 200 level and 250 feet of drifts. Inclined shaft has 250-foot crosscut north on 200 level. All workings were inaccessible in 1958. No recorded production.
	Mineral Spring	Reported in secs. 5, 8, T28S, R31E, MDM, about one mile south of Democrat Springs (1904); not confirmed, 1958	Undetermined, 1958; O. W. Meyers, Vaughn (1904)	Two to 7 foot-wide vein strikes NE. dips 45° SE.; in granitic rock.	Uncorrelated old name. Probably abandoned. (Aubury 04:13t, 17t).
272	Minnehaha (includes Rustler and San Diego) mine	N½ sec. 3, T30S, R40E, MDM, Rand dist., 1¼ miles southwest of Randsburg, on north flank of Government Pk.	Miss Rose Maginnes, Randsburg, and estates of __ Hansen, and J. T. O'Leary (1958)	Gold-bearing fault zones in schist and quartz monzonite.	See text. (Aubury 04:13t; Brown 16:503, 509; Crawford 96:196; Hulin 25:80, 137-138; Jenkins 42:331t; Newman 23:221; Tucker 20:34; 29:41-42, 47; Tucker, Sampson 33:275t, 276t, 291, 319; Tucker, Sampson, Oakeshott 49:264t, 267t, 274t).
	Minnehaha mine	Loraine dist.			See text under tungsten.
	Minnesota group				See Gunderson group. (Brown 16:503).
273	Minnie E. claim	NE¼ sec. 28, T25S, R33E, MDM, Cove dist., 1 3/4 miles southwest of (new) Kernville, west side of Lake Isabella	Undetermined, 1958	Quartz veins in granitic rock.	Undeveloped claim. Production, if any, undetermined; long idle. (Aubury 04:13t; Brown 16:503; Tucker 24:34).
	Miranda claim				Former claim of Ashford Mines. (Crawford 96:193).
	Mohawk	Reported in sec. 35, T27S, R40E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; Underwood and McNitt, Bakersfield (1904)	Quartz vein with gold and copper in granite.	Uncorrelated old name; may be property listed under different name. One 70-foot inclined shaft. (Aubury 04:13t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Mohawk-Buddy mine	Reported in sec. 23, T29S, R36E, MDM, 11 miles north of Cantil (1949); not confirmed, 1957	Undetermined, 1957; W. E. Russell and associates, Cantil (1940)	Two veins in granite; one strikes NE. and dips 70° NW., the other strikes E. and dips 65° S. Veins range in width from 2 to 5 feet.	Workings consist of a 50-foot and a 70-foot shaft on the NE.-trending vein and a 287-foot drift on the E.-trending vein. May be a westward extension of the San Antonio vein system. Idle since about 1940. (Tucker, Sampson 40:35; Tucker, Sampson, Oakeshott 49:264t).
	Mojave Bonanza claim				Former claim of Silver Queen mine. (Tucker, Sampson 33:275t).
	Mojave Copper Co.	Reported in secs. 20, 21, T29S, R38E, MDM, El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; Mojave Copper Co., Bakersfield (1904)	Copper, gold, and silver in quartz veins in metamorphic rocks.	Uncorrelated old name. Probably long idle company. (Aubury 04:13t, 19t).
274	Mojave Mining & Milling Co. (includes Discovery, Double Standard, Gem, North Star, Mountain Key, Single Standard) property	W½ sec. 5, T10N, R12W, SBM, Mojave dist., 4 miles south of Mojave on the northeast slope of Soledad Mt.	Mojave Mining & Milling Co., Bert Wegman, pres., P.O. Box 195, Randsburg (1958)	Several fissure veins strike NE., dip NW.; in rhyolitic rocks. Cerargyrite and argentite occur in narrow discontinuous veinlets along fractures.	Developed by 200-foot shaft with levels at 100 and 200 feet; 650-foot drift on 100 level; and 850-foot drift on 200 level. Also 3 drift adits including one over 1,000 feet long. Production less than 100 tons containing average of 1.1 oz. gold and 9 oz. silver per ton. Idle since 1918. (Aubury 04: 10t, 13t, 14t, 15t; Brown 16:491-492; Julihn, Horton 37:23; Tucker 23:158; 29:31; 35:468; Tucker, Sampson 33:273t, 283; Tucker, Sampson, Oakeshott 49:257t).
	Monarch	Reported in T29S, R34E, MDM, Piute Mts. (1904); not confirmed, 1958	Undetermined, 1958; W. J. Thornton, Piute (1904)	One-foot-wide vein strikes NE., dips 80° SE.; in granite.	Uncorrelated old name. Probably long abandoned. Originally developed by 60-foot shaft and 150-foot adit. (Crawford 96:194).
275	Monarch prospect	SW¼ sec. 5, T10N, R12W, SBM, Mojave dist., on northeast slope of Soledad Mt.	Wilson Estate (?) address undetermined (1958)	Two quartz veins strike N. 10° W., dip 60° NE.; in fine-grained rhyolite. Veins cut off by E-W fault at south end. Displaced segment not found.	Southern extensions of Ajax, and Karma veins of Wegman group. Crosscut 587 feet S.74° W.; 294 feet from portal, crosscut exposes 18-foot width of Ajax vein; 542 feet west of portal, Karma vein is exposed across 45-foot width. Four hundred feet north of portal, short adits and opencuts expose 18 feet of Ajax vein which assayed $5 per ton. (Tucker, Sampson 40:34, 35; Tucker, Sampson, Oakeshott 49:230, 264t).
276	Monarch Rand group	SE¼ sec. 1, T30S, R40E, MDM, Stringer dist., 2 miles southeast of Randsburg	Undetermined, 1957; Monarch Rand Mining Co., W. O. Walker, pres., 222 S. Thomas St., Pomona (1949)	Vein composed of brecciated silicified schist is 3½ feet wide along hanging wall of quartz-latite porphyry. Vein strikes N. 40° E., dips 60° SE., and contains pyrite, stibnite, gold, and silver. Also stringers in schist. Principal production was from placer material which contained gold and scheelite.	Approximately 60 acres of patented land. Development consists of vertical shafts from 200 to 600 feet deep with about 500 feet of drifts appended at several levels. Deep shafts were developed in search for rich silver ore. Few hundred ounces of gold and undetermined amount of scheelite were produced in 1930's and early 1940's from placer material. Idle. (Averill 46:260; Brown 16:505, 522t; Hulin 25:82, 87, 138-139; Jenkins 42:330t; Partridge 41:288; Tucker 29:58; Tucker, Sampson 41:576-577; Tucker, Sampson, Oakeshott 49:271t, 274t).
	Monarch Tungsten Gold Mining Co. property				See Monarch Rand group. (Brown 16:505; Partridge 41:288).
	Mondora (Polka Dot)	Reported in sec. 21, T27S, R33E, MDM, (1904); not confirmed, 1957	Undetermined, 1957	Quartz vein with gold, and lead and arsenic sulfides in metamorphic rocks.	Uncorrelated old name; probably long abandoned prospect. (Aubury 04:13t, 17t; Crawford 94:146, 96:195).
	Monitor group	Reported in sec. 36, T30S, R33E, MDM, Loraine dist., 3 to 4 miles southeast of Loraine (1904); not confirmed, 1958	Undetermined, 1958; J. N. Thomson & Co., Kern City (1904)		Uncorrelated old name. Probably long abandoned. (Aubury 04:13t).
	Monte Cristo	Reported in sec. 34, T28S, R39E, MDM, El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; A. Marty, Randsburg (1904)	Quartz veins in porphyritic and granitic rocks.	Uncorrelated old name. Probably a long abandoned prospect. (Aubury 04:13t).
	Monte Cristo claim				Patented claim of Yellow Aster mine. (Aubury 04:13t).
	Montezuma claim				Patented claim of Yellow Aster mine. (Aubury 04:13t).
	Montezuma mine				See Ruby mine. (Tucker, Sampson 33:324).
	Mooers claim				Patented claim of Yellow Aster mine. (Crawford 96:194).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
277	Moon claim	SW¼SE¼ sec. 33, T28S, R38E, MDM, El Paso Mts., 10 3/4 miles north-northeast of Cantil, in gulch west of Bonanza Gulch	Mrs. Fay Moon, Whittier (1958)	Gold-bearing Quaternary gravels form narrow mesa along west side of Bonanza Gulch. Bedrock is sedimentary rocks of Tertiary Goler and Ricardo formations.	One 20-acre placer claim; name undetermined. Probably some production of placer gold.
278	Mooncastle prospect	SE¼ sec. 26 and SW¼ sec. 25, T26S, R32E, MDM, Keysville dist., 3 miles north-northwest of Bodfish	E. J. Lunenschoss, Bodfish (1957)	Narrow gouge-filled vein strikes N. 40° E., dips 70° SE.; in quartz diorite.	Developed by 150-foot crosscut adit, short drift, and several caved workings of undetermined size. One man active part time. No recorded production.
	Moren Sophie group				Group of claims which includes Winnie mine and probably other mines. See Winnie mine.
	Morning Glory	Reported in sec. 21, T28S, R32E, MDM, Clear Cr. dist., 3 or 4 miles southwest of Havilah, (1904); not confirmed, 1958	Undetermined, 1958; Morning Glory Gold Mining Co., Pasadena (1904)	Four veins, 1 to 4 feet wide, strike NW., vertical; in granitic rock.	Uncorrelated old name. Probably long abandoned prospect. Originally developed by 200 to 300 feet of workings. (Aubury 04:13t).
279	Morton prospect	SE¼ sec. 26, T26S, R32E, MDM, Keyes dist., 3 miles northwest of Bodfish	C. O. Dickerson, Bodfish (1957)	Northeast-striking vein in granodiorite.	No recorded production. Idle.
	Mountain group				See Orphan Anne prospect under copper. (Dibblee 52:59t).
	Mountain Key claim				Claim of Mojave Mining Milling Co. (Aubury 04:13t).
	Mountain King prospect				See Southern Cross group. (Aubury 04:13t; Brown 16:510).
	Mountain View claim				Claim in Elephant group. (Aubury 04:13t; Tucker 23:159).
280	Mount Breckenridge (Iron Mountain Nos. 1, 2) prospect	NW¼ sec. 4, T29S, R31E, MEM, one mile south of Hoosier Flat, 4 miles west of Breckenridge Mt.	Undetermined, 1957; D. Hartz, Bakersfield (1904)	Hematite-rich micaceous schist from 10 to 200 feet wide strikes NE., dips 45° SE.	Also listed under iron. Production undetermined. Long idle. (Aubury 04:11t, 19t; Brown 16:516; Tucker 21:312; 29:56; Tucker, Sampson, Oakeshott 49:270t).
	Mt. Henderson group	Reported in sec. 30, 31, T30S, R34E, MDM, Loraine dist., about 2 miles southwest of Loraine (1904); not confirmed, 1958	Undetermined, 1958; A. J. Henderson & Co., Kern City (1904)		Uncorrelated old name. Probably long abandoned. (Aubury 04:13t).
281	Nadeau (Rankin) mine	NE¼ sec. 11, T26S, R37E, MDM, southwest side Indian Wells Cyn., 9½ miles northwest of Inyokern	William Siebert and sons, 4216 Glenalbyn Dr., Los Angeles 65 (1957)	Poorly-defined quartz vein strikes NW., dips 60° - 70° NE.; in schist and quartzite. Vein is a few tens of feet southwest of a contact between granitic rocks and metasedimentary rocks. Vein contains free gold with pyrrhotite, pyrite, and arsenopyrite. Wall rocks of vein also contain quartz and sulfides. Southeastern part of claims contain tactite which, farther to the southeast, has yielded scheelite on adjoining claims of F.O.B. mine, which see in tungsten section.	Three unpatented lode claims. Developed by two drift adits, (Nadeau and Rankin) several open cuts and short adits, and several hundred feet of bulldozed cuts. Nadeau level contains about 450 feet of exploratory adits; Rankin level, 80 feet above Nadeau level contains a 40-foot drift adit, a 45-foot winze, and about 60 feet of drifts at bottom of winze. Most of gold ore mined was from Rankin level. Production undetermined; a small lot of ore from Rankin level averaged 1/3 oz. of gold per ton. (Information partly from unpublished report by B. M. Snyder, 1938)
282	Nancy Hanks mine	SE¼ sec. 2, T30S, R40E, MDM, Rand dist., 1¼ miles south of Randsburg	Yellow Aster Mining and Milling Co., 6331 Hollywood Blvd Los Angeles (1958)	Free gold in mineralized fault zones in iron-stained schist. Principal zone strikes N. 75° E., dips 50° N., 1-7 feet wide, and several tens of feet long. Assays of $30.00 per ton in gold were obtained from 2-foot width of the vein (Hulin, 1925, p. 139).	Patented claim. Inclined shaft 190 feet deep and drift adits on three levels. Moderate amount of near-surface stopes. Production information included with Yellow Aster mine. Long idle. (Crawford 96:194; Hess 10:40; Hulin 25:139).
283	Naomi prospect	SE¼SW¼ sec. 34, T28S, R39E, MDM, El Paso Mts., 15 miles northeast of Cantil, half a mile west of Goler Gulch	Earl V. Ehrhardt, 4240 Canon Dr., La Canada (1958)	Northeast-trending, iron-stained fractures in Paleozoic metasedimentary rocks. Also auriferous gravels of Tertiary Goler formation.	Developed by shallow inclined shaft at southwest end of an open cut in metasedimentary rocks. Probably no production. Idle.
	Napoleon mine				See Santa Ana group. (Aubury 04:13t; Brown 16:485; Tucker, Sampson 33:276t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Napoleon	Reported in Loraine dist. (1904); not confirmed, 1958	Undetermined, 1958; Jas. F. Ellis, Kern City (1904)		Uncorrelated old name. (Aubury 04:13t).
284	N.A.W. prospect	SE¼, sec. 36, T26S, R31E, MDM, Greenhorn dist., 1 mile east of Davis Guard Sta.	V. R. Stonebraker (1957) (address undetermined)	Narrow fracture zone strikes N. 40° E., dips 70° NW.; in medium-grained granodiorite. Vein intersects narrow pegmatite dike at a point 50 feet from the portal. Dike strikes nearly parallel to vein but dips 45° SE. Another fracture zone a few hundred feet east of portal strikes N. 75° E., dips 75° SE. Intersection of two veins has not been prospected.	Developed by 75-foot drift and a 15-foot winze. Older workings to the east (caved) developed by shaft and a 100-foot drift adit, towards shaft. No recorded production. Idle.
	Neglected claim				Claim of Big Gold mine. (Tucker 23:166; Tucker, Sampson 33:291).
	Nellie Dent mine	NW¼ sec. 33, T25S, R33E, MDM, Cove dist., 3¼ miles southwest of (new) Kernville, west side of Lake Isabella	Kern Development Co., C. S. Long, pres., Box 157, Hayward. Leased to Kern Mines Inc., Roland Toggnazzini, pres., 260 California St., San Francisco (1955)	Quartz veins in granodiorite and alaskite.	See Big Blue group in text. (Aubury 04:13t; Brown 16:482, 505; Crawford 94:146; Prout 40:385, 390, 392; Tucker 24:35, 36, 41; 29:42; Tucker, Sampson 33:275t, 281, 289; Tucker, Sampson, Oakeshott 49:264t).
285	Nellie K. prospect	SW¼ sec. 33, T27S, R31E, MDM, about 25 miles northeast of Bakersfield, one mile above Democrat Springs, adjacent to north bank of Kern River	Mr. Wm. S. Fewell, Kern River Route, Bakersfield (1958)	Two to 4-foot-wide vein strikes nearly due N., dips steeply E.; in granitic rock. Vein is composed principally of iron-stained fault gouge containing free gold.	Development consists of a 60-foot inclined shaft. No recorded production.
	Nellie S and Maggy B	Reported in sec. 12, T27S, R32E, MDM (1904); not confirmed, 1957	Undetermined, 1957; Rayo Mining and Dev. Co., Los Angeles (1904)	Quartz vein in porphyritic rock.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:135t).
	Nemitz (New Deal, Mexican) prospect	Center of N½ sec. 28, T30S, R33E, MDM, Loraine dist. ½ mile south of Loraine on the northwest side of a tributary cyn. to Indian Cr.	Nellie M. Nemitz, 852 W. 73rd St., Los Angeles 44 (1958)	Three to 5-foot-wide vein strikes N. 45° W. and dips 63° NE.; in schist. Vein consists of brecciated schist in a post-brecciation white quartz and very sparse pyrite. An occurrence of graphite also present on the property. It occurs as irregular streaks in a 5 to 10-foot wide zone along planes of schistosity in a gray mica schist.	Developed by drift adits, 90, 150, and 50 feet long spaced at 15 to 25-foot intervals. No evidence of stoping and no recorded production. (Tucker, Sampson 33:275t).
287	Nephi prospect	Sec. 25, T26S, R32E, MDM, 1½ miles northwest of new Isabella	Undetermined, 1957	Fracture zone, 8-feet wide strikes N. 40° E., dips 75° SE.; in granodiorite. 1/8 to 1 inch seams of iron-stained clayey gouge occur on hanging wall and footwall; fractured quartz diorite lies between. Pronounced N. 55° W., vertical jointing intersects vein.	Workings consist of a 15 by 7 by 8 feet deep open cut along vein and a 10-foot drift N. 40° E. into the vein outcropping. Fifteen feet below this and 30 feet to SE. is the beginning of a cross-cut-adit driven N. 30° W. on a joint in granodiorite.
	Nevada Placer Mining Co. property	Reported in sec. 12, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; Thomas W. Duke, address undetermined (1904)	Placer gold in alluvium.	Uncorrelated old name. Probably long idle company. Property probably listed herein under different name. (Aubury 04:18t).
288	New Deal mine	NE¼SW¼ sec. 3, T30S, R40E, MDM, Rand dist., 1 3/4 miles southwest of Randsburg, on west flank of Government Pk., Rand Mts	Stewart D. Fraser and C. D. Wise, Randsburg (1957); leased to L. J. Osborn, W. H. Manuel, H. I. Faust, Los Angeles	Well-defined fault zone in quartz monzonite. Fault strikes N. 10° W., and dips 35° NE. into west side of Government Pk. Exposed along surface for few hundred feet; crosses inclusion of schist north of main inclined shaft. Southward from a point a few tens of feet south of main incline, a fault separates quartz monzonite on east from schist on west. In places rhyolite forms hanging-wall of fault. Well-defined hanging-wall with an average of 2-foot-thick zone of partly-crushed material in footwall.	Three claims, all of which have been assigned new names in recent years. Developed by 400-foot inclined shaft with about 300 feet of horizontal workings on several levels, a shorter inclined shaft north of main shaft, and south-driven drift near south end of exposed part of fault zone. History of development of mine undetermined. Probably moderately small output in 1930's. Idle. See photo in text.
	New Discovery	Reported in sec. 3, T28S, R32E, MDM, Clear Cr. dist., near Havilah (1904); not confirmed, 1958	Undetermined, 1958; John Hayes, Havilah (1904)	Four foot vein strikes NE., dips SW.; in granitic rock.	Uncorrelated old name. Probably listed herein under another name. (Aubury 04:14t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	New Eldorado	Reported in sec. 26, T27S, R40E, MDM, Rademacher dist., (1904); not confirmed, 1957	Undetermined, 1957; Underwood and McNitt, Bakersfield (1904)	Quartz vein with gold and copper in granite.	Uncorrelated old name; may be property listed herein under different name. Two inclined shafts, one 60 feet deep, one 200 feet deep, and an 80-foot drift adit. (Aubury 04:14t).
	New Mex group	Approx. sec. 1, T30S, R37E, MDM, 2 miles northwest of Gypsite siding of Southern Pacific R.R., southeast flank of El Paso Mts.	Undetermined, 1958; Formerly Mrs. J. S. Bishop (deceased)	Quartz vein 3 feet wide strikes N. 45° W., dips 70° SW.; in granitic rocks. Vein contains galena, chalcopyrite, pyrite, and traces of gold and silver.	Formerly 3 claims; abandoned by Bishop family. Probably listed herein under different name. Developed before 1929 by 60-foot shaft and 40-foot drift adit. (Tucker 29:42; Tucker, Sampson 33:275t).
	New York	Reported in Red Rock dist., El Paso Mts. (1896); not confirmed, 1958	Undetermined, 1958; ___ Hartley and ___ Hawthorn, Red Rock (1896)	Placer gold in alluvium.	Uncorrelated old name. Worked by dry placer methods in 1890's with low daily yield of gold. May be listed herein under different name. (Crawford 96:194, 195t).
	Night Owl	Reported in sec. 3, T28S, R32E, MDM, Clear Cr. dist. (1904); not confirmed, 1958	Undetermined, 1958; G. E. Thede, R. Travis, Havilah (1904)	One to 4 foot vein strikes N. 40° E., dip 80° SW.; in granitic rock.	Uncorrelated old name. Probably listed herein under another name. (Aubury 04; 14t).
289	Nobhill (Barlindo) prospect	Sec. 25, T26S, R32E, MDM, 1½ miles northwest of new Isabella	Wilbur R. Barclay, 12010 S. Western, Los Angeles (1958)	One to 4-foot-wide quartz vein in quartz diorite strikes N. 40° E., dips 80° E., in a fracture zone which is as much as 6 feet wide. Quartz contains sparsely distributed arsenopyrite and pyrrhotite, both of which are largely altered to limonite.	Development is limited to a 15-foot shaft with connecting 10-foot crosscut adit and several discovery shafts. Currently under geologic examination by consultant (1958).
290	Noble prospect	Approx. center east ½ sec. 4, T30S, R40E, MDM, Rand dist., 2 miles southwest of Randsburg, on northwest slope of Rand Mts.	Glenn Tramill, Johannesburg (1957)	Well-defined vertical fault zone 1 to 3 feet wide strikes N. 30° W.; in schist. Exposed approx. parallel to stream course for about 200 feet along strike; north end terminated against cross fault. Brown carbonate rock containing green mariposite is common in the area.	Older name undetermined. Developed by 4 shafts of undetermined depth spaced from 10 to 30 feet apart and at least one connecting drift at about the 30-foot level. Probably other drifts on lower levels. Tramill reports presence of moderately rich streaks of ore. Probably some production; undetermined. Idle.
	Norden mine				Former name of Huelsdonk placer mine; listed herein under Rand Gold Dredging Assoc. (Hulin 25:145-147; Tucker 29:43; Tucker, Sampson 33:275t, 319-320; Tucker, Sampson, Oakeshott 49:264t).
	Norman Placer	North end of town of Johannesburg, Rand dist.; not confirmed, 1957	Undetermined, 1957; Charles Norman, Randsburg, and G. J. Holohan, Los Angeles (1933)	Auriferous gravel on schist bedrock. Gravel cemented in places with caliche and described as being as much as 74 feet thick. Five to 6 feet of gravel adjacent to bedrock was mined before 1933 and reported to yield about $2.00 per cu. yd. from pay channel 12 to 15 feet wide.	Uncorrelated name. One claim. Developed by shaft to bedrock and 2 drifts; one was driven 50 feet to southeast, the other was driven 40 feet to northwest. May be the shaft which is about ¼ mile west of Operator-Divide mine, on southwest side of shallow stream channel. Probably long idle. (Tucker, Sampson 33:320; Tucker, Sampson, Oakeshott 49: 264t).
291	Northern View prospect	Center E½ sec. 20, T27S, R40E, MDM, Rademacher dist., 4 miles south of Ridgecrest	Marion C. Miller, address undetermined (1957)	Iron-stained, north-trending shear zone in quartz monzonite.	Three, shallow vertical shafts; a prospect; idle.
	North Extension Sumner (North Sumner, North Sumner Gold Mines Inc.) mine	NE¼ sec. 28, T25S, R33E, MDM, Cove dist., 1½ miles southwest of (new) Kernville, west side of Lake Isabella	Kern Development Co., C. S. Long, pres., Box 157, Hayward. Leased to Kern Mines, Inc. Roland Toggnazzini, pres., 260 California St., San Francisco (1955)	Quartz veins in shear zone in granodiroite and alaskite, and pre-Cretaceous metamorphic rocks.	See Big Blue group in text. (Aubury 04:14t; Brown 16:488; Newman 22:146-147; Prout 40:389, 390, 392, 393; Tucker 24:35, 36, 39-40; 29:42, 46; Tucker, Sampson 33:275t, 276t, 289, 320-321; Tucker, Sampson, Oakeshott 49:264t).
	North Star	Reported in sec. 6, T10N, R12W, SBM, Mojave dist. (1904); not confirmed, 1958	Not determined, 1958; Mojave Mining & Milling Co., Mojave (1904)	One to 5 foot-wide quartz vein strikes NW., dips NE.; in porphyritic rock.	Uncorrelated old name. Probably old claim name of Mojave Mining & Milling Co. (Aubury 04:14t).
	North Star claim				Claim at Big Gold mine, which see. Tucker 23:166; Tucker, Sampson 33:291).
	North Sumner (North Sumner Gold Mines, Inc.) mine				See North Extension Sumner.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Nugget Flat group	Secs. 33 and 34, T28S, R39E, MDM, in Nugget Flat, upper part of Goler Cyn., El Paso Mts.	Undetermined, 1958; P. C. Chamberlain, Los Angeles (1949)	Placer gold in gravels as much as 70 feet thick in valley in upper part of Goler Cyn. Nuggets recovered from area in 1890's were valued at from $10 to $50 each (Tucker, Sampson and Oakeshott, 1949, p. 217). Bedrock is lower member of Goler formation.	Formerly part of the Chamberlain group. Present name undetermined. Probably few hundred ounces of gold produced in 1890's and smaller amounts in 1930's and 1940's. Idle since 1940's. (Dibblee, Gay 52: 61t; Tucker, Sampson, Oakeshott 49:217).
	Nymph and Last Chance claims				See Last Chance mine (Tucker 33:275t).
292	Nyra prospect	Center S½ sec. 36, T26S, R31E, MDM, Greenhorn dist., 1 mile east of Davis Guard Sta.	Ray Bedford, Bakersfield (1957)	Quartz stringer (?) in granitic rock. No surface expression.	Developed by 10-foot shaft. One vertical diamond drill hole to intersect vein - negative results. No recorded production.
	Occidental mine				See Amalie mine under silver in text. (Crawford 94:146).
	O K group				See Stringer placer mines under tungsten in text.
	O K Placer	Reported in sec. 5, T28S, R31E, MDM (1904); not confirmed, 1958	Undetermined, 1958		Uncorrelated old name. Probably abandoned. Formerly ground sluicing operation. (Aubury 04:18t).
293	Old Baldy prospect	NW¼ sec. 1, T30S, R40E, MDM, Rand dist., 1¼ miles southeast of Randsburg	Chilerene Edmonds and Margery Doremus addresses undetermined, 1957	Iron-stained schist along north side of rhyolite dike which strikes N. 75° E.	Vertical shaft of undetermined depth. Probably no production. (Tucker, Sampson 33:275t).
	Old Bodfish claim				Old name. See Porter group. (Crawford 94:146).
	Old Cowboy mine				See Gold Peak and Cowboy mines in text under silver.
	Old Garlock	Reported in sec. 16, T29S, R39E, MDM, northwest of Garlock, El Paso Mts. (1952); not confirmed, 1958	Undetermined, 1958		Uncorrelated old name. May be part of Austin group. (Dibblee, Gay 52:59t).
294	Old Grandma group	SW¼ sec. 3, T28S, R32E, MDM, Clear Cr. dist., one mile west-northwest of Havilah, on south flank of O'Brien Hill	E. G. Johnson, Bodfish (1957)		No recorded production. Comprises 6 unpatented claims.
	Old Keyes				See Keyes mine.
	Old Look Out	Reported in sec. 12, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958	Placer gold in alluvium.	Uncorrelated old name. Probably listed herein under different name. (Aubury 04:18t).
	Old Mojave				See Wells Fargo. (Aubury 04:16).
	Olivette	Reported in sec. 6, T10N, R12W, SBM, Mojave dist. (1904); not confirmed, 1958	Undetermined, 1958; Bedbury Bros. & Gurner, Mojave (1904)	Three veins 2 to 4 feet-wide strike NW., dip E. Has granitic hanging wall, porphyritic footwall. Said to be extension of Karma vein.	Uncorrelated old name. Probably old claim name of Mojave Mining & Milling Co. or Wegman group. (Aubury 04:14t).
	Olympic group				See Summit Diggings Placer mines. (Tucker, Sampson 33:322).
	Olympus mine				Original name of Yellow Aster mine. Included Big Horse, Burcham, Burcham No. 2, California, Mariposa, Mooers, Nancy Hanks, Olympus, Rand, Singleton, Tennessee, and Trilby claims. All still claims of Yellow Aster mine except California. (Crawford 96:187, 193, 194, 195, 196, 197).
295	Opal prospecc	West of center of south boundary sec. 32, T28S, R34E, MDM, Piute Mts. area, one mile northwest of Claraville, about ¼ mile west of main road	Lloyd E. McManus, Postmaster, Claraville (1954)	Gold-bearing quartz stringers strike N. 65° E. through deeply weathered granitic rock.	Explored by 125-foot adit along vein (caved and inaccessible in 1954); 50-foot crosscut started, heading S. 70° W., to join adit; 20-foot shaft (caved in 1954) 100 yards west of adit portal. No production. Idle.
	Operator mine				See Operator Divide mine. (Tucker, Sampson 33:275t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Operator Consolidated mine				See Operator Divide mine. (Tucker, Sampson 40:35).
296	Operator Divide (Operator, Operator Consolidated, Phoenix, Valverde) mine	SE¼ sec. 25, T29S, R40E, MDM, Rand dist., half a mile north of Johannesburg	Operator Consolidated Mining Co., A. B. Meikeljohn, sec., 6331 Hollywood Blvd., Los Angeles (1958); Carl H. Dresselhaus, lessee (1958)	Quartz stringers and veins in five oxidized shear zones in schist; strike N. 45° W., dip 20° NE. Veins have well-developed hanging walls, poorly defined footwalls. Free milling finely disseminated gold occurs in lenses and shoots. Maximum width about 7 feet; average 2-3 feet. Veins poorly exposed on surface; exposed in trenches and open cuts for several tens of feet.	Eleven claims. Principal activity 1896-1899, 1902-1905, 1909-1913, 1932-1934, 1937-1939, and 1940-1942. Production before 1925 was $600,000 from ore which averaged about 0.8 oz. per ton in gold (Hulin, 1925, p. 140). Workings consist of a main inclined shaft with 2,000 feet of horizontal workings to a depth of 300 feet plus several other shafts to lesser depths. Lessee mines in easternmost workings each summer. (Aubury 04:14t, 17t; Brown 16:507; Hess 10:40; Hulin 25:80, 81, 140; Tucker 29:43-44; Tucker, Sampson 33:275t, 280, 321; 40:11, 35; Tucker, Sampson, Oakeshott 49:265t).
	Ophir claim				See Porter group. (Aubury 04:14t; Brown 16:506; Crawford 94:146; 96:194; Tucker 29:44; Tucker, Sampson 33:275t, 299-300; Tucker, Sampson, Oakeshott 49:265t).
297	Opportunity prospect	SE¼ sec. 25, T26S, R32E, MDM, 2 miles north-northeast of Bodfish	George N. Ross, Keyeville (1957)	A 3-inch to 2-foot-wide vein in a 3-foot fault zone strikes N. 45° E., dips 60° - 70° SE.; in granodiorite. The vein consists mainly of clayey gouge with free gold; very little quartz.	Development consists of an 80-foot inclined shaft, a 40-foot drift on the 28-foot level, a 50-foot drift on the 48-foot level, a 30-foot drift adit, and a 40-foot drift adit. The shaft is now caved. Shipped less than 100 tons which averaged a little over one ounce of gold per ton. (Tucker, Sampson 33:321-322).
	Ore mine				See Ferris mine.
	Orinoco	Reported in sec. 12, T27S, R32E, MDM, Clear Cr. dist., northeast of Havilah (1904); not confirmed, 1958	Undetermined, 1958; D. A. Coggswell, Vaughn (1904)	Three veins, 3 to 4 feet wide, strike E., dip N.; in granitic rocks.	Uncorrelated old name. Probably long abandoned prospect. (Aubury 04:14t).
	Oro Fino	Reported in sec. 7, T27S, R33E, MDM, (1904); not confirmed, 1957	Undetermined, 1957	Quartz vein in metamorphic rocks.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:14t).
	Oro Fino mine				See Rand group. (Aubury 04:14t; Brown 16:506; Crawford 96:194).
	Oro Fino placer				See Summit Diggins Placer mines. (Hulin 25:147-148; Tucker 29:44; Tucker, Sampson 33:275t, 322; Tucker, Sampson, Oakeshott 49:265t).
	Orphan Boy claim				See Gold Coin group. (Aubury 04:14t).
	Orphan Girl mine	NW¼ sec. 12, T30S, R40E, MDM, Stringer dist., 2 miles southeast of Randsburg	Undetermined, 1957; O. A. Phillips and D. C. Spearman, Randsburg (1929)	Two gold-bearing quartz veins in schist. Orphan Girl vein strikes N. 50° W. and dips 35° NE.; steepens to 65° NE. at 200-foot level of mine. Length of ore shoot is about 100 feet. Intersected by east-striking, 80° S.-dipping Sunshine vein (see Sunshine mine) 200 feet northwest of shaft on Orphan Girl vein.	May be same as Rizz. No. 2 claim. Discovered in 1896 and mined mostly in 1905-1906, 1911, 1928-1929, and 1934-1935. Principal output was in 1911. Total output is few hundred ounces of gold from ore that averaged about 0.4 oz. gold per ton. Orphan Girl vein is developed by a 370-foot inclined shaft with drifts totaling 500 feet on 3 levels. Long idle. (Aubury 04:14t; Tucker 29:44; Tucker, Sampson 33:275t; Tucker, Sampson, Oakeshott 49:265t).
	Osse[illegible] claim				Claim of San Antonio mine. (Tucker, Sampson 33:275t).
	Osso	Reported in vicinity of Bodfish (1904); not confirmed, 1958	Undetermined, 1958; Moore & Cross, Vaughn (1904)	Seven foot vein strikes NE., dips SE.; in metamorphic rocks.	Uncorrelated old name. Probably abandoned. (Aubury 04:14t).
	Outlook claim				Claim of Standard group. (Tucker 23:160).
	Oversight	Reported in sec. 6, T29S, R30E, MDM, near mouth of Kern Cyn. (1904); not confirmed, 1958	Undetermined, 1958; W. R. Clarke, Bakersfield (1904)	Quartz in granitic rocks.	Uncorrelated old name; probably long abandoned prospect. (Aubury 04:14t).
	Palmer	Bodfish Cr. (1888); not confirmed, 1957	Undetermined, 1957		Uncorrelated old name. Prospect under development in 1888. May be listed herein under different name. (Goodyear 88:316).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Pasadena	Reported in secs. 3, 10, T28S, R32E, MDM, (1904); not confirmed, 1958	Undetermined, 1958	Vein strikes NE., dips SE.; in granitic rock.	Uncorrelated old name. Probably listed herein under another name. (Aubury 04:14t).
298	Pasadena mine	SW¼NE¼ sec. 8, T29S, R38E, MDM, El Paso Mts., 8½ miles north-northeast of Cantil, on east side of Last Chance Cyn.	Undetermined, 1958; R. A. Roberts, (Pasadena Mine Products Co.,), 1107 E. Colorado St., Pasadena 1 (1952)	Placer gold in sandy gravels of Quaternary terrace deposit along east side of Last Chance Cyn. Gold appears to be mostly in lower few feet on western edge of terrace, as indicated by exploration. Lateral distribution of gold and proportion of gold undetermined. Bedrock is lower members of Pliocene Ricardo formation.	Prospected and mined along west edge of terrace deposits by trenching and drifting. Trench is about 400 feet long and from 10 to 30 feet wide; drifts and prospect holes dug into east wall of trench. Probably several tens of ounces of gold recovered. Long idle. (Dibblee, Gay 52:61t).
	Patsy claim	Stringer district			See Stringer district placer mines under tungsten in text. (Averill 46: 260).
	Patterson	Reported in sec. 7, T28S, R40E, MDM, El Paso dist. (1904); not confirmed, 1957	Undetermined, 1957; W. E. Patterson, Garlock (1904)	Mineralized dike in granitic rocks.	Uncorrelated old name; may be property listed herein under different name. One 100-foot tunnel. (Aubury 04:14t).
299	Pay Day prospect	SW¼ sec. 28, T29S, R36E, MDM, in Butterbread Cyn., 9½ miles northwest of Cinco	W. B. and Lola Fraser, 5007 N. Landis, Baldwin Park (1957)	Quartz stringer strikes N. 45° E., vertical; in quartz monzonite.	Developed by shaft about 100 feet deep. A prospect; idle.
	Paymaster claim				Probably old name of claim of Yellow Aster mine. (Aubury 04:14t).
	Pay Roll	Reported in vicinity of Democrat Springs on ridge south of Kern R. (1929); not confirmed, 1958	Undetermined, 1958; A. L Conners, Bakersfield (1929)	Two 1 to 2-foot-wide veins strike NE. and E., dip 45° SE. and S.; in granitic rock.	Uncorrelated old name. Developed by short adits and shallow shafts. Probably abandoned. (Tucker 29:44).
	Pearl claim				Claim of Zenda mine. (Aubury 04:14t).
300	Pearl Wedge (Victory Wedge) mine	NE¼ sec. 11, T30S, R40E, MDM, Stringer dist., 2 miles south of Randsburg	Glenn Tramill, Johannesburg (1957)	Gold-and scheelite-bearing stringers 8 inches to 2 feet wide; in schist. Stringers dip NW. and strike NE. onto adjoining claims. See also Merced mine.	A small fraction of a claim between Merced and Santa Ana claims. Three shafts to depths of 250 feet and probably a few hundred feet of drifts on several levels. Total output of few hundred ounces of gold in 1909-1910 and 1936-1937. Tungsten output undetermined. (Aubury 04:14t; Tucker 29:44; Tucker, Sampson 33:275t; Tucker, Sampson, Oakeshott 49:265t).
	Penimore mine				See Pinmore mine. (Hess 10:40).
	Pennsylvania mine				See High Grade mine. (Aubury 04:14t; Tucker 29:45; Tucker, Sampson 33:275t, 322, 323; Tucker, Sampson, Oakeshott 49:265t).
301	Pestle group	NW part of sec. 4, T30S, R40E, MDM, Rand dist., 2½ miles west-southwest of Randsburg northwest slope of Rand Mts.	S. M. Mingus, P.O. Box 94, Randsburg (1958); Leased to Frank Dawson, Los Angeles	Several fractures and fault zones in schist. Some contain gold, others contain minor amounts of manganiferous material. Gold content by assay from material in northwest part of claims is $5 per ton (S. M. Mingus, personal communication, 1958).	Approx. 8 claims. Developed by exploration shafts and drifts. Probably no production. Part-time development work being conducted by one man in 1957.
	Philadelphia Wedge claim				Fraction claim at southeast end of Butte mine. (Aubury 04:14t).
	Phoenix mine				See Operator Divide mine. (Brown 16: 507).
	Pickwick mine	Reported in sec. 3, T27S, R33E, MDM, (1904); not confirmed, 1957	Undetermined, 1957	Quartz vein in granite.	Small production before 1916. Developed by several thousand feet of workings on 3 adits. Probably long abandoned. (Brown 16:506).
	Pine Tree	Reported in secs. 3, 10, T28S, R32E, MDM, Clear Cr. dist., west of Havilah (1904); not confirmed, 1958	Undetermined, 1958; John Hayes, Havilah (1904)	Vein strikes NE., dips SE.; in granitic rock.	Uncorrelated old name. Probably listed herein under another name. (Aubury 04:14t).
	Pine Tree	Reported in sec. 2, T27S, R33E, MDM (1904); not confirmed, 1957	Undetermined, 1957	Quartz vein in granite.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:14t).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
302	Pine Tree (American, Victoria) mine	NW cor. sec. 3 and NE cor. sec. 4, T11N, R15W, SBM, 4 miles south of Tehachapi, on north slope of ridge in Tehachapi Mts.	Carl H. Claussenius, 1248 S. Ridgeley Dr., Los Angeles 19 (1958)	Free gold in quartz veins in granitic rocks. Veins also contain sparse sulfides. Veins strike east to northeast and dip 20° to 40° S. or SE. Maximum width is about 3 feet; length probably few hundred feet. Veins offset at several places by cross-faults. Quartz in veins is white to pale pink and is nearly everywhere broken into fragments about ¼ inch in average size and partly recemented. Hanging wall and footwall of veins also brecciated in most outcrops. Scheelite occurs locally in the quartz veins.	Principal operation was before 1910 by which time 5 adits from 80 to 800 (?) feet long and several thousand feet of drifts and stopes were developed. Principal adits were driven SW. and S. and drifts extended along vein from them. Older lower adit portals covered by dumps of upper adits. Production reported to be $250,000 in gold from 1876 to 1907 (Brown, 1916, p. 506). Minor production of gold in 1935 and tungsten in 1942-1943. Tungsten mined from open cut several tens of feet west of main workings. All of the adits are caved at portals and inaccessible. (Aubury 04:8t, 14t, 16t, 17t; Brown 16: 485t, 506; Crawford 96:194-195; Jenkins 42:332t Tucker 29:45; Tucker, Sampson 33:275t, 280; 41:577-578; Tucker, Sampson, Oakeshott 49:265t).
303	Pinmore (Croesus, Penimore) mine	SE¼ sec. 25, T29S, R40E, MDM, Rand dist., half a mile north of Johannesburg	Stewart Fraser, Randsburg (1957)	Quartz-bearing iron-stained shear zones in schist. Veins strike N. 25° E., dip 25° SE. and are exposed for several hundred feet on west side of a moderately-low hill. Grade of ore ranged from half an oz. of gold per ton to about 1 oz. per ton.	Few thousand ounces of gold recovered 1897-1899, 1902-1903, and 1932-1938. Developed by 2 inclined shafts to 300 feet and 300-foot crosscut adit. Horizontal workings probably exceed 2,000 feet on several levels. Long idle. (Aubury 04:14t, 17t; Brown 16:507; Crawford 96:195; Hess 10:40; Hulin 25: 144; Tucker, Sampson 33:275t; Tucker, Sampson, Oakeshott 49:265t).
304	Pinon Hill prospect	W½ Sec. 6, T9N, R17W, SBM (proj.), south side of Canyon del Gato-Montes, 15 miles northeast of Gorman, southeast flank of Tehachapi Mts.	Tejon Ranch Co., P.O. Box 1560, Bakersfield (1958)	Auriferous gossan formed from the alteration of massive pyrite bodies in limestone at granite-limestone contact. Some material reported to contain $20 per ton in gold (Wiese, 1950, p. 47).	Gossan bodies on south edge of limestone on Pinon Hill were explored by Pinon Hill Mining Co. in 1941. No production. Idle. (Wiese 50:47).
	Pioneer	Reported in sec. 12, T27S, R32E, MDM (1904); not confirmed, 1957	Undetermined, 1957		Uncorrelated old name may be same as Pioneer tunnel of Big Blue group. (Aubury 04:14t; Crawford 96:195, 199t).
	Piute claim				See Tropico mine. (Tucker, Sampson 33:275t; Tucker, Sampson, Oakeshott 49:265t).
	Piute Consolidated	Reported in sec. 13, T28S, R34E, MDM, Piute Mts. (1916); not confirmed, 1958	Undetermined, 1958; Piute Consolidated Mining Co., (1949)	Quartz vein, 2 feet wide, in granitic rocks, strikes NE. and dips 45° SE. Free milling gold in a pay shoot 150 feet long.	Uncorrelated old name. May be an erroneous location. Workings consisted of 300-foot crosscut adit with short drifts 150 feet from portal. In 1913, owner recovered $2,500 in gold from 80 tons of ore. (Brown 16:506-507; Tucker 29:45 Tucker, Sampson 33:275t; Tucker, Sampson, Oakeshott 49:265t).
	Placer Gold Co. property	Stringer dist., about 2 miles southeast of Randsburg			A company that recovered placer gold and scheelite from alluvial material in vicinity of Baltic mine. Dry placer method of recovery utilized 1898-1913, sluicing methods used about 1916. Production probably attributed to claims from which material was removed. Long idle. (Boalich, Castello 18:13t; Brown 16:507, 522t; Partridge 41:289t).
	Pleasant View mine	Piute Mts.			See King Solomon mine. (Tucker 33:274t).
	Pluto	Reported in sec. 9, T27S, R32E, MDM (1896); not confirmed, 1958	Undetermined, 1958; Max Helmes, Havilah (1896)	Three parallel quartz veins strike N., dip S.; in granitic rock. Widest vein is 18 inches.	Uncorrelated old name. Probably abandoned. May be in T. 28 S. (Aubury 04:14t; Crawford 96:195).
	Pluto and Socratic	Reported in sec. 17, T29S, R39E, MDM, El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; G. D. Vetter, Garlock (1904)	Quartz veins containing sulfides in granite.	Uncorrelated old name. May be listed herein under different name. (Aubury 04:14t).
305	Plymouth (Pinyon tunnel site) prospect	SE¼ sec. 25, T28S, R35E, MDM, near crest on south slope of Pinyon Mt., 15 miles northwest of Cinco	James S. McIntyre and John Howson, addresses undetermined (1957)	Iron-stained quartz vein strikes approximately west; in quartz monzonite.	Exploratory crosscut adit extends 150 feet N. 15° W. and shallow winze sunk on quartz vein at face. Several older (mostly caved) exploration holes on surface a few hundred feet west and northwest of portal of crosscut adit. A prospect; idle.
	Polar Bear mine	Reported in secs. 20 and 29, T27S, R33E, MDM,; not confirmed, 1957	Undetermined, 1957	Small veins in granite.	Uncorrelated old name. Production of $8,000 in gold from pockets in veins before 1916. (Aubury 04:14t; Brown 16:507; Tucker, Sampson 33:275t; Tucker, Sampson, Oakeshott 49:265t).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Polka Dot				See Mondora.
	Pomona Mill and Mining Co. property	Reported about 3 miles north of Goler; El Paso Mts. (1894); not confirmed, 1958	Undetermined, 1958; Pomona Mill and Mining Co., Los Angeles (1894)	Gold-bearing clays and sandstones; also coal bed about 14 inches thick which dips gently north. Prospects of coal also reported one mile or more north of this locality.	May be in vicinity of Apache copper mine or same as Colorado Camp group. Property abandoned by 1896. (Crawford 94:147, 457; 96:195).
	Populist	Reported in sec. 7, T28S, R33E, MDM, (1904); not confirmed, 1957	Undetermined, 1957; R. D. Farmer, Havilah (1904)	Quartz vein in granite.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:14t).
306	Porter prospect	NE¼ sec. 31, T26S, R32E, MDM, Greenhorn dist., 2¼ miles east of Davis Guard Sta.	Porter (1957) (address undetermined)	Veins in granitic rock.	No recorded production. Idle.
307	Porter (Ederl group, McKeadney, McKidney, Old Bodfish, Ophir, Venus) group	NE¼ sec. 9, T28S, R32E, MD M, 1¼ miles west by southwest of Havilah and 1 mile south-southwest of O'Brien Hill	H. V. Porter, Rt. 1, Box 84 Caliente (1957)	Quartz veins in quartz diorite.	See text. (Aubury 04:13t, 14t; Brown 16: 503, 506; Crawford 94:146; 96:193, 194; Tucker, Sampson 29:41, 44; 33:275t, 299-300; Tucker, Sampson, Oakeshott 49:257t, 264t, 265t).
	Portuguese	Undetermined (1957)	Undetermined, 1957	Gold in quartz.	Probably situated along an old stage route near a tributary to Walker Basin Cr. in the northeast part of T. 30 S., R. 31 E., M.D.M. Long idle. Production undetermined. (Crawford 96:195, 199t).
308	Poso mine	SW¼ sec. 30, T27S, R30E, MDM, on Poso Cr. 1½ miles southwest of Pine Mt.	Bill Fritz, Mission Hotel, Bakersfield, Mr. Longway, 616 18th St., Bakersfield, J. H. Steppe, Granite Station	Quartz veins in granitic rock.	See text. (Tucker 29:45; Tucker, Sampson 33:275t, 323; Tucker, Sampson, Oakeshott 49:266t).
	President prospect	Reported in sec. 4, T27S, R32E, MDM, about 3 miles northwest of Bodfish, not confirmed, 1958	Undetermined, 1958; H. V. Porter, Box 8, Rt. 1, Caliente (1950)	Vein strikes NE., dips 40° E.; in granodiorite. Ore shoot 60 feet long and averaged 14 inches in width. Vein has been traced 1,500 feet.	Developed by a 465-foot adit and 150 feet of drifts. No recorded production. Long idle. (Brown 16:507, 508; Tucker 29:46; Tucker, Sampson 33:275t; Tucker, Sampson, Oakeshott 49:266t).
309	Pride of Mojave (includes Four Star(mine	NW¼ sec. 33, T11N, R12W, SBM, Mojave dist., 3 miles south of Mojave, at base of northeast slope of Standard Hill	Undetermined, 1958; C. C. Calkins, W.W. Kaye, Alfred Siemon, Mojave (1940)	Several calcite veins strike about N. 20° W., dip 60°-65° NE,; mostly in quartz monzonite. Quartz-latite porphyry forms one wall in some parts of vein. Lenticular discontinuous streaks of quartz within the calcite contain free gold and cerargyrite with iron, lead, and copper sulfides and carbonates. Calcite is stained by manganese and iron oxides.	First operated about 1934. Produced about 4,500 tons between 1939 and 1941 which averaged about 0.15 oz. of gold and 0.5 oz. of silver per ton; over 9,000 lbs. of lead and 1,800 lbs. of copper were recovered as by-products. Developed by Pride of Mojave shaft and Four Star shaft which are 265-foot inclined and 240-foot vertical shafts, respectively. Levels at 70, 135 and 230 feet in Pride of Mojave shaft. Horizontal workings total over 4,000 feet. Fifty-ton mill built about 1939; additional equipment to handle tungsten installed 1941. Mill now dismantled. (Eric 48:255t; Julihn, Horton 37:31,32; Tucker, Sampson 35:474-475, 481-482; 40:35-36).
	Princeton				Uncorrelated old name; may be part of Commonwealth mine (Aubury 04:14t).
310	Prize prospect	SW¼ sec. 28, T27S, R40E, MDM, Rademacher dist., 5 miles south of Ridgecrest	W. C. Barnes, address undetermined (1957)	One-foot-wide, iron-stained shear zone along east side of a vertical, north-striking dioritic dike in quartz monzonite.	Developed by a 60- to 80-foot vertical shaft. A prospect; idle.
	Producer prospect				See Ellston prospect. (Aubury 04:14t, 17t; Brown 16:493).
	Prospector (Wilhelmina)	Reported in sec. 26, T26S, R32E, MDM, Keyes dist., not confirmed, 1957	Undetermined, 1957; Conley & Lee (1904)	Two eight-inch-wide quartz veins strike NE., dip E., in granitic rock.	Probably obsolete name. Developed by a 45-foot inclined shaft, a 170-foot and a 250-foot drift. (Aubury 04:14t).
	Prosperity prospect				See under tungsten.
311	Punkie (Vestry) prospect	Center of south boundary sec. 32, T28S, R34E, MDM, Piute Mts. area, one mile northwest of Claraville, about 1/8 mile west of main rd.	Bill Miller, 8621 Evergreen St., South Gate (1954)	Gold-bearing quartz seams in zone about 1 foot wide strike N. 50° E., dip 50° S., through deeply weathered granitic rock.	Explored by means of 40-foot adit driven along vein. A few dollars reported recovered from exploration work, 1930-1931. Idle.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
312	Putnam group (Sparkplug)	South edge of sec. 2 and NE¼ sec. 11, T29S, R39E, MDM, El Paso Mts., 1 mile northwest of mouth of Goler Cyn., 15 miles northeast of Cantil	A. L. Putnam trust; John Janney, Pioche, Nevada, trustee (1958)	Auriferous gravels at base of Tertiary Goler formation and in Quaternary gravels derived from them. Fine to coarse flakes and nuggets of gold occur in basal beds of Goler formation resting on Paleozoic bedrock and in Quaternary gravels and Recent stream gravels down slope from them.	Includes 5 lode claims and one 160-acre placer claim. Formerly part of Janney and Goler Cyn. Placer groups. Principal source of gold was from Sparkplug claims on south edge of sec. 2. Basal beds of Goler formation mined in exposure on north side of small cyn. where exposure of conglomerate is 1,000 feet long, and 10 to 20 feet thick with no overburden. Mined along width of 250 to 400 feet. Undetermined production of gold in 1890's and 1930's. Some small scale placer mining in recent years. (Tucker, Sampson 33:306-307).
	Pyramid (Tip Top)	Undetermined, 1957	P. J. Osdick (?) Red Mountain		Uncorrelated name. Reported in several localities within few miles of Johannesburg. May be in San Bernardino County. (Aubury 04:14t; Brown 16:508; Tucker, Sampson 33:275t; Tucker, Sampson, Oakeshott 49:266t).
313	Queen Esther	E½ sec. 6, T10N, R12W, SBM, Mojave dist., 5 miles southwest of Mojave, in a narrow north-trending canyon on north slope of Soledad Mt.	Harvey Mudd Estate, Pacific Mutual Bldg. Los Angeles; G. H. Lateau estate, (address undet.) Mary Boyle estate, (address undet.)	Quartz vein in rhyolitic volcanic rocks.	See text under Golden Queen mine. (Aubury 04:14t; Brown 16:508; Julihn and Horton 37:4, 19; Newman 23:307; Tucker 23:162; 29:46; Tucker, Sampson 33:275t, 279, 280, 283; 35:465, 466, 468, 475, 482; Tucker, Sampson, Oakeshott 49:266t).
	Queen of Sheba	Reported 2½ miles southeast of Havilah (1933); not confirmed, 1958	Undetermined, 1958; J. L. Stubblefield, Havilah (1933)	Six inch to 2-foot-wide vein strikes NE., dips 80° NW.; in granitic rock.	Uncorrelated old name. Probably long abandoned prospect. Originally developed by 200-foot drift adit. (Tucker, Sampson 33:323).
	Queen of the Desert	Reported in vicinity of Red Rock (1904); not confirmed, 1958	Undetermined, 1958; Underwood and McNitt, Bakersfield (1904)	Copper, gold, and lead in quartz veins in granitic and metamorphic rocks.	Uncorrelated old name. May be listed herein under different name. (Aubury 04:14t).
314	Quien Sabe (?) prospect	NW¼ sec. 9, T10N, R13W, SBM	Undetermined, 1958; William S. Allen, Pasadena (1937)	Two quartz veins 100 feet apart strike N. 40° W., nearly vertical. Veins are 2 to 4 feet wide in quartz latite porphyry.	Developed by 20-foot and 70-foot shafts and crosscut adit driven S. 5° E. 520 feet then 135 feet southwest.
	Racket	Reported in Goler dist., El Paso Mts. (1896); not confirmed, 1958	Undetermined, 1958; ___ Gunnison and others, Randsburg (1896)	Placer gold in alluvium.	Uncorrelated old name. Worked by dry washing methods in 1890's with low daily yield of gold. Probably listed herein under different name. (Crawford 96:190t, 195).
315	Rademacher (Barron, Rademacher) mine	S½ sec. 29, T27S, R 40E, MDM, Rademacher dist., 5 miles south-southwest of Ridgecrest	V. C. Osmont, address undetermined (1957)	Free gold in poorly-exposed siliceous, iron- and copper-stained shear zones in foliated granodiorite gneiss. Shear zones, mostly only a few inches thick at surface, strike N. 30° E., dip 80° NW. Copper stains are sparsely disseminated along folia in granodiorite gneiss mostly in quartzose or fine-grained schistose layers interstratified with gneiss. Foliation strikes N., dips steeply east.	Two patented claims. Developed by 3 shafts, several shallow prospect shafts, and at least 1,500 feet of drifts. Deepest shaft is 250 feet deep and is near base of west side of hill. Two other shafts only a few feet deep are about 1,000 feet northeast of deep shaft. Idle. (Aubury 04:14t).
316	Rainbow prospect	NW¼ sec. 10, T30S, R40E, MDM, Rand dist., about 2 miles southwest of Randsburg	P. J. Osdick, Adolph Bulla, Red Mountain (1957)	Gold, scheelite, and manganese-bearing minerals in brecciated schist along footwall of fault that strikes N. 10° W. and dips 40° NE. Gold and scheelite occur with brecciated quartz stringers in a 4-foot-thick zone of brecciated schist. Manganese oxides occur as rich pockets a few inches in maximum width in footwall of fault. Total length of fault is several hundred feet. Lenses as much as 3 feet by 10 feet composed of mariposite and dolomite occur along hanging wall of fault.	Developed by several inclined shafts and adits a few tens of feet in maximum length along a strike distance of 50 feet. Shallow prospect pits have been excavated along the fault a few hundred feet from the shafts. Probably small production of scheelite. Idle. (Brown 16:508).
	Rand	Reported in sec. 32, T11N, R12W, SBM, Mojave dist., 3 miles south of Mojave on Standard Hill (1904); not confirmed, 1958	Undetermined, 1958; C. C. Calkins, K.A. Calkins, Mojave (1904)	Several north-striking veins, dip E. in porphyritic and granitic rock.	Uncorrelated old name. Probably former name of claim at what is now Pride of Mojave mine. (Aubury 04:15t).
	Rand claim				Patented claim of Yellow Aster mine. Many of the underground workings are in this claim. (Aubury 04:18t; Crawford 96:195).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
317	Rand Gold Dredging Assoc. (Includes Norden) property	Secs. 22, 23, 24, T29S, R40E, MDM, about 2 miles northwest of Johannesburg	Frank P. Adams, 2610 Russ Bldg., 235 Montgomery St., San Francisco (1958)	Gold- and scheelite-bearing Recent gravels in valley alluvium north of Rand Mts. Recoverable gold and scheelite occurs in an estimated 5,000,000 cubic yards of gravel as much as 35 feet thick beneath 10 feet of overburden (Tucker, Sampson, and Oakeshott, 1949, p. 231). Gravel was explored by pits and drill holes about 1942.	Placer claims of several owners leased about 1942. Present holdings undetermined (1958). Small output of gold by several operators since discovery in 1890's. Most recent production was in 1948 when Foley Brothers of St. Paul, Minnesota operated a 3½ cubic yard bucket line dredge and a Monighan and Bodinson washing plant on an artificial pond. Production undetermined. Dredge was moved about 4 miles to the Blackhawk mine south of Red Mountain in San Bernardino County in 1957. Idle since 1948. (Averill 46:260; Tucker, Sampson 43:122; Tucker, Sampson, Oakeshott 49:231, 266t).
318	Rand (Clay Bank, Confidence, Oro Fino, Rand, Relief, St. Charles) group	SW¼ sec. 3, T28S, R32E, MDM, Clear Cr. dist., 1 mile northwest of Havilah, east side of O'Brien Hill	J. L. Bennett, P. O. Box 67, Bodfish (1957)	Quartz veins in quartz diorite.	See text. (Aubury 04:9t, 14t; Brown 16:508; Crawford 94:143, 146; 96:188, 194; Goodyear 88:31, 316, 317, 331; Tucker, Sampson 33:275t, 276t; Tucker, Sampson, Oakeshott 49:266t).
319	Rand Placers	Approx. NW¼ sec. 12, T29S, R39E, MDM, southeast flank of El Paso Mt., mouth of Reed and Benson Gulches, 14 3/4 miles northeast of Cantil	Yellow Aster Mining and Milling Co., 6331 Hollywood Blvd., Los Angeles (1958)	Placer gold deposits in Quaternary terrace and stream deposits. Gold, apparently derived from auriferous gravels of lower member of Goler formation, occurs in Quaternary terrace deposits down slope from the Goler formation and terrace gravels. Gravels cover a ½-mile wide strip along flank of mountains and occur in bottom of small stream channels. They range in thickness from few feet to several tens of feet. Gold occurs near base of gravels and in "false bedrock" composed of cemented layers in gravel. Gold is mostly small particles and flakes but nuggets valued at few hundred dollars have been found.	Company owns 7 claims in this area. Have been source of considerable amount of placer gold as well as water for use in mills. Most of gold produced in 1890's and 1930's from shallow but moderately large excavations to bedrock. Gold has been recovered by large number of operators, most of whom were individuals operating with portable dry washers. Intermittent small-scale operations as recent as 1958. (Dibblee, Gay 52:61t; Tucker, Sampson 33:275t; Tucker, Sampson, Oakeshott 49:275t).
	Rattler	Reported in sec. 11, T29S, R39E, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; J. W. Short, Randsburg (1904)	Placer gold in alluvium.	Uncorrelated old name. May be listed herein under different name. (Aubury 04:18t; Crawford 96: 190t, 195).
	Rattlesnake	Reported in Rand dist., about 1 mile south of Johannesburg (1910)			Uncorrelated old name probably listed herein under different name. In vicinity of Wade H. group. (Hess 10:40).
	Rattlesnake group	Approx. sec. 32, T29S, R38E, MDM, 2 miles north of Gypsite siding of Southern Pacific R. R., southeast slope of El Paso Mts.	Undetermined, 1958; Formerly Mrs. J. S. Bishop (deceased)	Several parallel quartz veins in granite strike northwest and dip 40°-60°. Veins are from 1 to 2 feet wide and contain cerrusite, galena, copper oxides, and traces of gold and silver.	Formerly 2 claims; abandoned by Bishop family. Developed by shallow shafts and open cuts; deepest shaft is 40 feet. (Dibblee, Gay 52:59t; Tucker 29:59; Tucker, Sampson, Oakeshott 49:266t, 271t).
	Rawhide	Reported in sec. 28, T29S, R34E, MDM, Piute Mts. (1916); not confirmed, 1958	Undetermined, 1958; A. R. Budlong, Piute (1916)	Quartz vein in granite is 18 inches wide, strikes N., and dips 30° E. Locally high grade, free milling ore.	Uncorrelated old name. Probably listed herein under different name. A small producer before 1916. Developed by 380-foot tunnel with 250 feet of drifts. (Aubury 04:15t; Brown 16:508-509).
	Rayo prospect				See under antimony. (Aubury 04:14t).
320	Red Bird mine	SE¼ sec. 1, T30S, R40E, MDM, 1 3/4 miles southeast of Randsburg, Stringer dist., adjoins south boundary of Baltic	Grace Landes, 13061 Berrydale St. Garden Grove (1958)	Gold- and scheelite-bearing stringers in schist. Principal stringer strikes approximately west, dip undetermined but probably dips steeply to south or vertical. Stringer is 500 feet long between two shafts. Small exposed stringers are approximately parallel to principal one. Locally-derived alluvium contains scheelite and gold.	Two claims. Property is bounded on all sides by claims which have been sources of gold and scheelite. Developed by 135-foot vertical shaft at east end of claim and 500-foot inclined shaft 500 feet to west; both on main stringer. Shafts are connected by drift at 135-foot level. Small amount of scheelite has been recovered from placer material and sorted material from dump at vertical shaft. Several tens of ounces of gold was produced in 1930's. Idle since about 1940.
	Red Cross	Reported in sec. 11, T27S, R32E, MDM, west of Bodfish (1904); not confirmed, 1958	Undetermined, 1958; A. McDonald, Ramonda (1904)	Three to 5-foot-wide vertical vein strikes NE.; in granitic rock.	Uncorrelated old name. Probably abandoned. May have been part of Bonnie Brae property. (Aubury 04:15t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Red Hill mine	SE¼ sec. 21, T25S, R33E, MDM, Cove dist., 1 1/3 miles southwest of (new) Kernville, west side Lake Isabella	Kern Development Co., C. S. Long, pres., P. O. Box 157, Hayward (1949)	Quartz veins in shear zone in Mesozoic granodiorite and alaskite, and pre-Cretaceous metamorphic rocks.	See Big Blue group in text. (Brown 16: 509; Tucker 29:46; Tucker, Sampson 33:275t, 320; Tucker, Sampson, Oakeshott 49:266t).
321	Red Strike prospect	Center, west border sec. 34, T29S, R36E, MDM, between Hoffman cyn. and Butter-bread cyn., 8½ miles northwest of Cinco	William O. Young, W. K. Frew, Mojave (1957)	North-striking vertical quartz vein in quartz diorite. Vein is heavily iron-stained, from 4 to 10 inches wide, and exposed discontinuously along the surface for about 200 feet. Vein is parallel to a rhyolite dike that is only a few feet to the east.	Two claims. An old prospect developed by an east-driven crosscut adit, probably about 200 feet long, to intersect quartz vein. A 100-foot vertical raise was extended to the surface. Surface cuts have been bulldozed across and along vein in recent years. Idle; probably no production.
322	Red Wing mine	SW¼ sec. 26, T27S, R40E, MDM, Rademacher dist., 5 miles south-south-west of Ridgecrest	Phillip O. Liebel, Beowawe, Nevada, and Mrs. Fred Risley, address undetermined (1957)	Quartz veins, 4 inches to 3 feet in width, strike approximately N. 15° W., dip an average of 30° SW.; occur in granitic rocks and along the contacts of rhyolitic and dioritic dikes. Vein system crops out discontinuously for about a mile along strike. Extends into Haunita claim, which see. Principal ore shoot pitches N. 50° W. in 4 to 6-inch-wide quartz vein near southeastern end of vein system. Locally contains coarse, free gold.	Three patented claims. Principal shaft is 180 feet deep on a 30° incline. A drift adit extends 75 feet north on 170 foot level. Vein system has been prospected elsewhere by numerous shallow excavations. See also Haunita mine. (Tucker, Sampson, Oakeshott 49:231-232, 266t).
323	Reform prospect	Secs. 1, 12, T28S, R33E, MDM, south fork of Erskine Cr., Piute Mts.; not confirmed, 1957	Mrs. Nora D. Coulston, Pasadena (1949)	Two-foot-wide quartz vein strikes N. 30° E., dips 60° SE.; in granite. Vein contains ruby silver.	Lower drift adit on vein 200 feet and 150-foot drift adit 50 feet above. Average value of ore reported to be $3 per ton in gold and 25 oz. silver. Huntington mill on property in 1933. Long idle. (Tucker, Sampson 33:275t, 323; Tucker, Sampson, Oakeshott 49:266t).
	Regent claim				Former claim of Queen Esther group, now Sailor Girl claim. (Tucker 23:162; Tucker, Sampson 33:282; 35:pl. 7).
	Regina claim				Claim of Queen Esther mine (see Golden Queen mine in text). (Tucker 23:162; Tucker, Sampson 33:282; 35:pl.7).
	Relief claim				See Rand group. (Goodyear 88:317).
	Republic	Two and ½ miles southeast of Randsburg	Undetermined, 1957; P.O. Fifield, Randsburg (1896)	Quartz vein in schist (?).	Uncorrelated old name. Last known in 1896, presumably known by different name now. On same vein as Hawkeye mine. (Crawford 96:195).
	Resurrection mine				See Rochefort mine. (Crawford 96:195).
324	Retreat mine	Adjacent corners secs. 4, 5, 8, T29S, R34E, MDM, Piute Mts. area, about 3/4 mile southwest of Claraville, in headwaters canyon of Kelso Cr. tributary that flows by Claraville	J. B. Inman, P.O. Box 17, Claraville (1954)	Eight to 20-inch-wide gold- and silver-bearing quartz stringers strike N. 35°-40° E. in deeply weathered, somewhat sheared granitic rock. Ore occurs as "kidneys" and in irregular, discontinuous masses which average $23 per ton.	One patented claim. Developed and worked through more than 700 feet of adits and several winzes, all caved or flooded in 1954. Largest adit driven S. 35° W. for 380 feet.; 100-foot drift driven S. 40° W. from same portal. One hundred feet above, an adit was driven 100 feet southwest from a point 100 feet west of the main adit portal; another was driven 100 feet southwest from a point 150 feet farther west. First active 1930-1932; main productivity 1937 to 1939, inactive since 1944. Production undetermined.
	Revenue claim				Claim of Standard group. (Aubury 04: 15t; Tucker 23:160).
325	Reward prospect	SW¼ sec. 34, T27S, R40E, MDM, Rademacher dist., 5½ miles south of Ridgecrest	George C. Petts, P.O. Box 247, Randsburg (1957)	Iron-stained quartz vein, with free gold, in quartz monzonite. Vein strikes N. 35° W., dips 65° NE.	From a 65-foot inclined shaft drift adits have been extended 50 feet southeast, and 25 to 30 feet northwest on the 35-foot level. Minor production. Idle.
	Rex claim				Claim of Queen Esther mine (see Golden Queen mine in text). (Aubury 04:15t; Tucker 23:162; Tucker, Sampson 33:282; 35:pl.7).
	Reymert claim				Claim of Wegman group. (Aubury 04:15t; Tucker, Sampson 33:282; 35:pl.7).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
326	Ricardo placer (Includes Deep Channel, Ricardo, Ricardo Deep Channel No. 1, and Tufa Quarry claims) mines	Reported in sec. 2, T30S, R37E, and sec. 35, T29S, R37E, MDM, El Paso Mts., half a mile to 1½ miles north of site of Redrock	Undetermined, 1958; Several patented claims owned by Mrs. Nora B. Hazen estate, Bakersfield (1951); also other owners in general area	Fine to coarse placer gold occurs in stream gravels and remnants of fanglomerates. The gold is, in part, derived from reworked gravels and conglomerates of the Ricardo and Goler formations, now exposed upstream from the present concentrations. Local concentrations of gold in the stream gravels and fanglomerates, largely worked in the 1890's, yielded some large nuggets of gold. Operators in 1930's estimated the deposits averaged 35¢ per yard in gold (Tucker and Sampson, 1933, p. 324).	Several patented claims consisting of 2,000 acres in one group and other unpatented claims. This general area has yielded several thousand ounces of gold; mostly from small operations in the 1890's and 1930's when the gold was recovered by dry concentrating methods. Deeply-buried gold in cyn. bottom is too wet to be recovered by dry concentrating and water is not abundant enough to support large slucing or hydraulicking operation. Idle since 1930's. (Crawford 94:456-458; 96:195; Dibblee, Gay 52:61t; Tucker 29:46; Tucker, Sampson 33:276t, 323-324; Tucker, Sampson, Oakeshott 49:267t).
	Riches & Wealth	Reported in NW¼ sec. 19, T27S, R33E, MDM, 2 miles west of Isabella on a ridge north of French Gulch (1929); not confirmed, 1957	Undetermined, 1957; Ernest Griffith, Bakersfield (1933)	Two narrow parallel veins strike NE., dip 45° NW.; in granitic rock. Gravel in gulch also worked in placer operation.	Uncorrelated old name. Probably abandoned. Workings consist of a 60-foot shaft, two shallow shafts, and 240 feet of drifts. Thirty yards of gravel reportedly yielded $50 in gold. (Tucker 29:46-47; Tucker, Sampson 33:276t; Tucker, Sampson, Oakeshott 49:267t).
	Rip Rap				See Skinner.
	Riveredge placer	Reported in sec. 19, T27S, R32E, MDM, about 8 miles southwest of Bodfish on the Kern R. between Greenhorn and Stovepipe Cks. (1949); not confirmed, 1958	Undetermined, 1958; P. W. Wilson, P.O. Box 8, Kern Canyon Rt., Bakersfield (1949)	Very fine free gold in Recent gravels of the Kern River. Concentrates said to consist of large amounts of black sand.	Uncorrelated name. Probably abandoned. Originally comprised 8 claims along 3,000 feet of river bank. (Tucker, Sampson 33:324; Tucker, Sampson. Oakeshott 49:267t).
327	Rizz No. 2	NW¼ sec. 12, T30S, R40E, MDM, Stringer dist., 1½ miles south of Randsburg	W. C. Wilkenson, Johannesburg, and Ameco Rizzardini, Randsburg (1957)	Stringer in iron-stained schist strikes N. 60° W., dips 40° NE.	Formerly Golden Eagle claim. May be same as Orphan Girl claim, which see. Developed by inclined shaft to undetermined depth. Production undetermined. Long idle.
328	Rochefort (Resurrection, Rotchfort) mine	SW¼ sec. 9, T28S, R32E, MDM, Clear Cr. dist., 1 mile west of Havilah, 2 miles southwest of Lightner Pk.	___ Miles, Pasadena (1957)	Vein is 1 to 7 feet wide, strikes NE., dips 65° SE.; in granitic rock. Appears to belong to the same vein system as the Porter and Rand groups to the northeast.	Main activity prior to 1900. Workings consist of 220-foot shaft, 350 feet of drifts, 200-foot tunnel and 40-foot winze, but are now mostly caved. Idle. (Aubury 04:14t; Crawford 94:144, 147; 96:195).
	Rocket claim				Former claim of Ashford Mines. (Crawford 96:195).
329	Rock Pile prospect	SW¼ of SW¼ of sec. 16, T29S, R34E, MDM, Piute Mts. area, 2¼ miles south of Claraville, about ½ mile by dirt road northwest of Gallup Camp	John Rogers (1954) address undetermined	Quartz stringer zone, 2 to 3 feet wide strikes E., dips 60° S.; in granitic rock. converges with similar vein zone that strikes N. 45° E., dips 50° SE. near easternmost exposure.	Exposed for about 100 yards along strike by series of 5 shallow shafts (reported as deep as 50 feet, but largely caved in 1954). Trench 3 feet deep, 150 feet long exposes NE.-trending vein. Production undetermined; long idle.
	Rocky Pt. claim				Former claim in Echo group; now Santa Ana claim of Golden Queen mine. (Tucker 28:158; Tucker, Sampson 33:282, 35:pl.7).
	Roper	Reported in sec. 6, T10N, R12W, SBM, Mojave dist. (1904); not confirmed, 1958	Undetermined, 1958; A. M. Hunter, Mojave (1904)	Two 1 to 3 foot quartz veins, strike NE., dip NW.; in porphyritic rock.	Uncorrelated old name. Probably described herein under another name. (Aubury 04:15t).
	Rose mine	Reported in sec. 31, T26S, R32E, MDM, Greenhorn Mts. about 2½ miles east of Davis Guard Sta. (1954); not confirmed, 1957	Laury, Jack, and Laury M., Rose, (1957) address undetermined	Three-foot vein strikes NE., dips 60° E. in granitic rock.	Development consists of 140-foot shaft, 700 feet of drifts, and a 230-foot crosscut adit. Probably significant production prior to 1890 but no recorded production since. (Aubury 04:15t; Brown 16:509; Tucker, Sampson 33:276t; Tucker, Sampson, Oakeshott 49:267t).
330	Rose M. claim	SW¼ sec. 2, T30S, R40E, MDM, Rand dist., 1¼ miles south of Randsburg	Miss Rose Maginnes, Randsburg (1957)	Shear zone in schist.	Fractional claim south of Nancy Hanks claim. Shallow vertical shaft.
	Rotchford mine				See Rochefort (Aubury 04:14t; Crawford 94:144, 147; 96:195).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Rough & Ready	Reported approx. NW¼ T27S, R32E, MDM, Greenhorn Mts., northwest of Havilah (1896) not confirmed, 1957	Undetermined, 1957; Charles Lamont, Kernville (1896)	Quartz vein in granitic rock.	Uncorrelated old name. Development consists of several hundreds of feet of workings. (Crawford 96:195).
	Royal	Approx. T25S, R29E, MDM, (1896): not confirmed, 1957	Undetermined, 1957; Richard Roberts, White River (1896)	Eight inch quartz vein strikes E., dips 70° N.; in mica schist.	Uncorrelated old name. Probably abandoned. Formerly described in Tulare County. Developed by 90-foot shaft. (Crawford 96:471).
331	Ruby (Blue Bell, Curly Jim, Montezuma) mine	SW¼ sec. 9, T29S, R31E, MDM, 2½ miles south of Hoosier Flat, 5½ miles southwest of Breckenridge Mt.	Undetermined, 1954; George Thatcher, Bakersfield (1949)	Three gold-bearing quartz veins strike about N. 30° E., dip 65° SE. Veins lie athwart contact between Mesozoic quartz diorite, and pre-Cretaceous schist. Veins range from 2 to 8 feet wide, and contain free gold, pyrite, arsenopyrite, and chalcopyrite. Ore occurs as pods or lenses with maximum dimension of 15 feet along strike, 25 feet high, and 2½ feet wide.	Discovered about 1870. Recorded production exceeds 500 oz. gold. Last operated in 1938. Developed principally by 100-foot vertical shaft with 275-foot crosscut east at bottom connecting to 120-foot drift southwest and 100-foot drift northeast. Ten feet northeast of the crosscut is a 120-foot winze sunk at 45° incline to southeast; at 30 feet northeast is a stope 15 feet long, 25 feet high, and 2½ feet wide. At 85 feet southwest of crosscut is a 40-foot raise to stoped area. About 130 feet south of 1st shaft is an older shaft sunk 90 feet on the vein, and which connects with the drift southwest on the 100 level. Workings of undetermined magnitude append this shaft. (Tucker, Sampson 33:276t, 324-326: Tucker, Sampson, Oakeshott 49: 267t).
	Ruby	Reported in sec. 23, T29S, R40E, MDM, Rand dist.	Undetermined, 1957	Two quartz veins, 1 to 5 feet wide, strike NW., Dip NE.; in schist. Free milling.	Uncorrelated old name; may be property listed herein under different name. Twelve shafts 20 feet to 150 feet deep and 600 feet of drifts. (Aubury 04:15t)
	Russian Bear vein				See Glen Olive mine (Aubury 04:15t).
	Rustler and San Diego claims				Patented claims of Minnehaha mine. See Minnehaha mine in text. (Brown 16:509; Crawford 96:196; Tucker 29:47; Tucker, Sampson 33:276t; Tucker, Sampson, Oakshott 49:267t).
	Ruth	Reported in sec. 12, T27S, R32E, MDM (1904); not confirmed, 1957	Undetermined, 1957; Herman Fusell, Havilah (1904)	Quartz vein in granite.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:15t).
	Sailor Boy claim	Center sec. 6, T10N, R12W, SBM, Mojave dist., 5 miles southwest of Mojave, on north slope of Soledad Mt. due south of Golden Queen tailings.	Moore and Townsend (address undet.)	An extension of the Queen Esther vein which strikes N. 40° W., dips 50° NE.; ranges in width from 3 to 20 feet and extends several thousand feet along strike.	Former claim of Golden Queen mine.
332	San Antonio mine	NW¼ sec. 23, T29S, R36E, MDM, about 2 miles east of Butterbread Cyn. 10 miles northwest of Cinco	Undetermined, 1957; J. Martino, Bakersfield, and Mrs. Lee, San Fernando (1949)	Quartz vein, average width about 12 inches, in crushed quartz monzonite; strikes N. 80° E., vertical. Exposed nearly continuously along surface for 900 feet.	Principal shaft is about 165 feet deep. Developed by 6 other shafts 50 to 100 feet deep and numerous shallow trenches and open cuts. Some drifts from shafts. Discovered about 1887; small production 1908-1910, 1935, 1937. Idle. (Tucker 29:47; Tucker, Sampson 33:276t, 326; Tucker, Sampson, Oakeshott 49:267t).
	Sandstone	Reported approx. T25S, R29E, MDM, 4 miles southeast of White River on Blue Mt. (1916); not confirmed, 1957	Undetermined, 1957; Henry Moore, White River (1916)	Four-foot shear zone strikes N. 75° E., dips 75° N.; in granitic rock.	Uncorrelated old name. Probably abandoned. Formerly described in Tulare County. Developed by three shallow shafts. (Crawford 94:147; 96:196).
	Sand Turtle claim	Reported in sec. 11, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; J. W. Short, Randsburg (1904)	Placer gold in alluvium.	Uncorrelated name of claims worked in 1890's and early 1900's. Dry placer methods of recovery resulted in obtaining low daily yield of gold. Probably listed herein under different name. (Aubury 04:18t; Crawford 96:190t, 196).
333	Santa Ana group	NE¼ sec. 11, T30S, R40E, MDM, Stringer dist., 2 miles south of Randsburg	George Carr, Bakersfield (1957)	Two groups of gold- and scheelite-bearing stringers about 1,000 feet apart; in schist. Southern stringers are northeast continuation of stringers on Merced and Pearl Wedge claims. Northern group consists of several NE.- and E.-trending stringers 10 to 20 feet apart and dipping steeply N. or S. Average width of vein material is about 2 feet. Veins are offset in several places and some veins converge. Exposed on surface for 1,000 to 1,500 feet.	Napoleon, Santa Ana, and Yucca Tree patented claims. Total output of several thousand ounces of gold in 1897-1902 valued at $400,000 (Brown, 1916, p. 510) and 1905-1918, and few hundred ounces at intermittent intervals between 1926-1942. Most of gold obtained from Napoleon claim which is credited with an output of $100,000 (Hulin, 1925 p. 144). Very little gold credited to Yucca Tree claim. Minor amount of lead obtained from concentrates shipped in 1937 (Goodwin, 1957, p. 532). Tungsten output undetermined. Developed by

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Santa Ana group (continued)				about 20 shafts from 50 to about 350 feet deep and an undetermined amount of drifts. Long segments of the stringers are stoped to the surface from 100-foot level. (Aubury 04:13t, 15t, 16t; Boalich, Castello 18:13t; Brown 16:485; 509-510, 522t; Hulin 25:144; Tucker, Sampson 33:276t; Tucker, Sampson, Oakeshott 49:267t).
	Santa Junta	Reported in Long Tom gulch, 27 miles northeast of Bakersfield (1896); not confirmed, 1958	Undetermined, 1958; A. Herriara, et al., Bakersfield (1896)		Uncorrelated old name. Probably long-abandoned prospect. (Crawford 96:196).
	Sarah Jane	Reported in center sec. 28, T25S, R33E, MDM, Cove dist., 2¼ miles southwest of (new) Kernville (1904); not confirmed, 1958	Undetermined, 1958; J. E. Thede, Havilah (1904)	Veins, six inches to 2 feet wide, strike N. 34° W., dip 80° NE.	Uncorrelated old name. Probably part of Big Blue group. Reported to adjoin Lady Belle claim. (Aubury 04:15t).
	Sargert prospect				See Donnie prospect.
334	Scorpion claim	SW¼NW¼ sec. 34, T28S, R38E, MDM, El Paso Mts., 11½ miles north-northeast of Cantil, in Bonanza Gulch	A. H. Jones, Ridgecrest (1958)	Gold-bearing Quaternary terrace and stream gravels. Bedrock is sedimentary rocks in part, auriferous, of the Goler formation (Paleocene) and the Ricardo formation (Pliocene). Principal source of gold is probably at base of terrace gravels on edges of present stream channels.	Two 20-acre placer claims. Probably some production of gold when most of Bonanza Gulch was being worked by small-scale dry washing methods in 1890's and 1930's.
	Sedan				Uncorrelated old name; probably same as Palmer (Aubury 04:15t).
	Setting Sun	Reported in sec. 11, T27S, R32E, MDM, west of Bodfish (1904); not confirmed	Undetermined, 1958; T. A. Turner, Los Angeles (1904)	Two and one-half foot vein strikes E., dips N.; in granitic rock.	Uncorrelated old name. Probably abandoned. (Aubury 04:15t).
	Shafer and Whitney View	Reported in sec. 27, T28S, R34E, MDM, Piute Mts. (1933); not confirmed, 1958	Undetermined, 1958; Herman Gorman, Piute (1933)	Quartz vein, 2 feet wide, strikes NE., dips 70° SE.; in granite	Uncorrelated old name. Probably abandoned prospect. Developed by 150-foot adit driven southwest. (Tucker, Sampson 33:327).
	Shasta claim				Claim in Gwynne mine. (Tucker, Sampson 33:307-308).
	Sherman mine				See Bull Run (Goodyear 88:321).
	Shipsey mine	Aong Basin Cr. (north of Caliente) 1893; not confirmed 1958	Undetermined		Unconfirmed output of $3,000 in gold during 1891 (Watts 93:238).
	Shipsey mine				See King Solomon mine in Randsburg dist. (Tucker 21:310).
335	Shoestring prospect	SW cor. sec. 35, T30S, R32E, MDM, in Devil Canyon, 11 miles east-southeast of Caliente	Undetermined, 1958; Henry G. Hubbard, Eagle Rock (1938)	Contact between schist and quartz diorite.	Prospect. Long idle.
	Shoestring	Reported in sec. 12, T27S, R32E, MDM, Keyes dist., (1916) not confirmed, 1957	Undetermined, 1957; George W. King, Isabella (1914)	One foot quartz vein strikes NW., dips 60° E. Ore shoot was 80 feet long and averaged 10 inches in width.	Uncorrelated old name. May be listed herein under other name. Development consists of 430-foot adit and 600 feet of drifts. No recorded production. (Aubury 04:15t; Brown 16:510; Crawford 96:196).
	Side Hill wedge	Reported in sec. 12, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958	Placer gold in alluvium.	Uncorrelated old name. Probably listed herein under different name. (Aubury 04:18t).
	Side Issue				See Ferris mine.
	Side Issue	Reported in sec. 25, T27S, R33E, MDM, in Erskine Cr., 7 miles southeast of Bodfish (1894); not confirmed, 1955	Undetermined, 1955; Stebbins and Porter, Havilah (1894)		Prospect on southeast side of Iconoclast mine. (Crawford 94:147).
336	Sidewinder prospect	Center, W½ sec. 28, T29S, R36E, MDM, Butterbread Cyn., 10 miles northwest of Cinco	Charles and Elizabeth Larbig, address undetermined (1957)	Quartz stringers in quartz diorite.	Shallow pits, trenches, and shaft. A prospect; idle.

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
337	Sidewinder (Double Thirteen) prospect	NW¼ sec. 18, T30S, R40E, MDM, Rand dist., 5 miles southwest of Randsburg on northwest flank of Rand Mts.	Louise Wilsey (1958) (address undetermined)	Zone of iron-stained crushed schist, 6 inches to 1 foot wide, along fault that strikes N. 75° E., dips 70° S. Lateral extent of zone is about 100 feet. Ore contains coarse-crystalline pale brown calcite with fine, free-milling gold. Scheelite stringers as much as 2 inches wide and 10 feet long have been exposed in pits on ridge a few hundred feet west of cabin at main workings.	Ten claims. Inclined shaft a few tens of feet deep and minor amount of drifts on gold-bearing vein. Scheelite-bearing stringers exposed is a few shallow pits. Few ounces of gold recovered during early part of 1958 by lessees. Idle.
	Side Winder	Reported in sec. 2, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; J. E. Patterson, Randsburg (1904)	Placer gold in alluvium.	Uncorrelated old name. May be listed herein under different name. (Aubury 04:18t).
338	Sidney (White) mine	NE¼SE¼ sec. 17, T30S, R40E, MDM, Rand dist., 4½ miles southwest of Randsburg, on southeast edge of Rand Mts.	Clara M. Foglesong, trustee for Clara M. Foglesong trust, Mineral County, Nevada (1957)	Veins along faults in schist strike N. 60°-80° E. and dip moderately to steeply S. Average width of vein material is about 3 feet. An ore shoot mined on the 100-foot level of the Sidney vein was 260 feet long from 2 to 6 feet wide, and about 75 feet in vertical extent. Veins are composed of brecciated schist with quartz, free gold, pyrite, and probably arsenopyrite. Principal vein is about 600 feet long. Ore ranged in value from $10 to $200 in gold per ton. Average value of ore mined before 1933 was $27 per ton. Scheelite has been found in parts of the veins.	Eleven claims. Developed by inclined shaft on Sidney vein and shafts on two other veins. Sidney shaft is 275 feet deep on incline of 65° to 70° with levels at 70, 150, 200, and 250 feet; contains about 2,400 feet of drifts, mostly to west on the 3 lower levels to maximum distance of 525 feet. Drifts extend maximum of 125 feet to east. About 1,000 feet of horizontal workings on two other veins. Total output is reported to be about $250,000, mined mostly during the interval 1900-1910. Small output was made intermittently 1921-1936, and 1939-1941. Idle since 1941. (Brown 16:510; Hulin 25:72, 81; Tucker 29:51; Tucker, Sampson 33:276t, 280, 333-334; Tucker, Sampson, Oakeshott 49:267t, 269t).
339	Sierra Vista prospect	NE¼ sec. 22, T29S, R34E, MDM, Piute Mts. area, 3 miles south of Claraville, 100 yards west of Geringer Grade Rd., ¼ mile south of junction with road to Gallup Camp	A. W. Kimber, Rt. 5, Box 223, Bakersfield (1954)	Quartz stringers strike south, dip nearly vertically; in deeply-weathered granitic rock. Selected samples carry $75 to $80 per ton in gold.	Explored by 100-foot adit driven S. 10° W. (inaccessible in 1954), 85-foot adit driven S. 40° E., and 25-foot shaft (largely caved in 1954). No known production, idle.
340	Silver Bar Mining and Reduction Co. property	N½SE¼ sec. 4, T28S, R40E, MDM, Rademacher dist., 6½ miles south of Ridgecrest	Undetermined, 1957; Silver Bar Mining and Reduction Co., (1923)	Three- to 6-inch-wide quartz vein strikes N. 50° W., dips 55° NE.; in granodiorite. Poorly exposed and heavily iron-stained. Quartz contains between $1 and $32 in gold per ton (Newman, 1923, p. 148).	Developed by a 300-foot inclined shaft with 750 feet of drifts on the 50, 100, 150, 200, and 300-foot levels, and two shallow shafts spaced on the vein at 20 feet and 30 feet north of main incline. Vein has been mined at surface between shafts. Long idle. Name of owner in 1957 not determined but probably not Silver Bar Mining and Reduction Co. (Newman 23:147-148).
	Silver Boy claim				Uncorrelated old name; may be Tip Top claim of Queen Esther group. (Brown 16:510).
	Silver King	Reported in vicinity of Garlock (1904); not confirmed, 1958	Undetermined, 1958; B. H. Lawson, Bakersfield (1904)	Gold, lead, and silver in carbonate veins in granitic rocks.	Uncorrelated old name. May be listed herein under different name. (Aubury 04:15t).
341	Silverton prospect	NE¼ sec. 22, T30S, R40E, MDM, Rand dist., 4 miles south-southwest of Randsburg, on south edge of Rand Mts.	Caroline Johnson, address undetermined (1957)	Shear zone in schist strikes N. 70° E. and dips 75° SE. Gouge material assayed $6 per ton in gold and 2 oz. silver (Hulin, 1925, p. 143).	Several claims; some are patented. Developed by 160-foot inclined shaft with 40 foot crosscut on 100-foot level. No recorded production. Long idle. (Hulin 25:143).
	Silver Prince prospect				See Cactus Queen mine in text. (Eric 48:256t; Julihn, Horton 37:35, 36).
342	Silver Queen (Golden Queen, McBrayer, McBryer) mine	SE¼ sec. 6, T10N, R12W, SBM, Mojave dist., southeast of Golden Queen tailings on Soledad Mt.	Geo. Holmes and Townsend Estate, Yuma, Ariz. (1958)	Quartz vein in rhyolitic volcanic rocks.	See Golden Queen mine in text. (Aubury 04:13t; Julihn, Horton 37: 6, 14, 15; Tucker 23:162; Tucker, Sampson 34:316, 317; 35:465, 466, 475-479; Tucker, Sampson, Oakeshott 49:220-223).
	Silver T'	Reported in sec. 6, T10N, R12W, SBM, Mojave dist., (1904); not confirmed, 1958	Undetermined, 1958; Thomson & Boyle, Los Angeles	Quartz vein in rhyolitic volcanic rocks.	Uncorrelated old name. Probably now part of Queen Esther mine. (Aubury 04:15t).
	Single Standard claim				Claim of Mojave Mining & Milling Co. (Aubury 04:15t).
	Single Standard claim				Patented claim of the Yellow Aster mine. (Aubury 04:15t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Singleton claim				Patented claim of the Yellow Aster mine. Main shaft and many of underground workings on this claim. (Aubury 04:15t; Crawford 96:194, 196).
	Sixteen to One (Double Standard)	Vicinity of Johannesburg	Undetermined, 1957; Griffith Barris Johannesburg (1904)	Two quartz veins in granite.	Uncorrelated old name; may be property listed herein under different name. Two 40-foot inclined shafts and 80 feet of drifts. (Aubury 04:15t).
	Skinner (Rip Rap)	Reported in T29S, R33E, MDM, Piute Mts., east of Walker Basin (1896); not confirmed, 1958	Undetermined, 1958; Hugh Mann, Piute (1896)	Three-foot-wide vein composed of fault gouge and quartz; in granitic rock. Pyrite present in small proportion.	Uncorrelated old name. Probably long abandoned prospect. Originally developed by a 100-foot shaft with 50 feet of drifts and a 70-foot adit with a 40-foot winze. (Crawford 94:147; 96:196).
	Skukum	Sec. 33, T29S, R40E, MDM, Rand dist., west of Randsburg (1904); not confirmed, 1957	Undetermined, 1957; Wm. Bonchard and ___ Hansen, Randsgurg, (1904)	Quartz veins in metamorphic and granitic rock.	Uncorrelated old name; may be property listed herein under different name. One 110-foot inclined shaft, 50 feet of open cuts, 80-foot tunnel and 150 feet of drifts. (Aubury 04:15t).
343	Sky Line mine	Center sec. 8, T31S, R36E, MDM, in north tributary to Pine Tree Cyn., near south edge of Antimony Flat, 6 miles west of Cinco	Undetermined, 1955; Edward Pyle, 4601 East 52d Dr., Los Angeles (1949)	Quartz vein, 2 to 8 feet wide, with auriferous pyrite and other sulfides strikes N. 85° W., dips 70°-75° NE.; in granodiorite. Total length of vein more than 1,000 feet; another vein about 1,200 feet to north.	Three shafts; east shaft 250 feet deep with levels at 75, 140, and 250 feet; west shaft (1,000 feet to west) 200 feet deep with levels at 100 and 200 feet; north shaft (1,200 feet to north) 100 feet deep. Extent of workings on levels not determined. Ore concentrated in mill (now removed) south of mine. Principal mining in 1937-1938; ore averaged 0.44 oz. gold per ton; total production probably less than $25,000. Idle since 1940. (Tucker 38:12; Tucker, Sampson 40:36; Tucker, Sampson, Oakeshott 49:232, 267t).
	Slate Walls	Probably in vicinity of Devils Cyn., 6 miles east of Caliente; not confirmed, 1958	Undetermined, 1958; Orin Barr, Visalia (1896)	Vein, 2 feet wide, in schist.	Uncorrelated old name. Probably long abandoned prospect. Originally developed by 60-foot shaft and 20-foot drift. (Crawford 96:196).
344	Smith (Dorothy Bennett) prospect	Center sec. 9, T25S, R32E, MDM, 2 miles northeast of Greenhorn Summit on Cow Cr.	Ulah E. Smith, Sr., Rt. 1, Box 140, Santa Monica (1954)	Four-inch-wide quartz vein in granodiorite.	Development limited to a 10-foot inclined shaft and discovery shaft. One small shipment.
345	Snowbird mine	NE¼ sec. 26, T29S, R40E, MDM, Rand dist., 1 mile north of Randsburg	O. Zane Brown, Johannesburg (1957)	Two gold-bearing fault zones of brecciated schist. East fault strikes N. 25° W. and dips 60° NE. and is a few hundred feet long. Fault few hundred feet to west strikes N. 30° W., dips 60° NE. and is poorly exposed. Schist is iron-stained for several tens of feet on each side of the faults.	Three claims. East fault zone developed by 2 inclined shafts 500 feet apart north and south, a south-driven drift adit about 100 feet north of the south inclined shaft, and a vertical shaft about 100 feet east of the south inclined shaft. Two inclined shafts of undetermined depth and 55 feet apart on western fault zone. Probably some production but not recorded under present mine name. Previous name undetermined. Idle.
	Soledad claim				Formerly in Echo group and Elephant-Eagle group; now part of Golden Queen mine. (Aubury 04:15t; Julihn, Horton 37:7, fig. 5, 19, 20; Tucker 23:158; Tucker, Sampson 33:282; 35:pl.7).
	Soledad Extension mine				Formerly in Echo and Elephant-Eagle groups; now part of Golden Queen mine. (Julihn, Horton 37:4, 7, fig. 5, 23; Tucker 23: 158; Tucker, Sampson 35:468, 469, 482; 40:11, 31).
	Soledad Producers and Leard	Reported in sec. 34, T28S, R28E, MDM, 1 mile northeast of Oil City, along Kern R. (1904); not confirmed, 1958	Undetermined, 1958; Reed Crude Oil Co., Los Angeles (1904)	Placer deposit.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:18t).
	Sophie Moren mine				See Winnie mine.
346	Southern Cross (Includes Havilah, Mountain King, Uncle Sam mines) group	SW¼ sec. 3, NW¼ sec. 10, T28S, R32E, MDM, Clear Cr. dist., 1 mile west of Havilah, just south of O'Brien Hill	T. L. Porter and E. Porterfield, Bakersfield (1957)	Series of 4 quartz veins in granitic rock strike generally NE., dip 40°-70° SE. Vein system can be traced along strike for 2,000 feet.	Development consists of 2,000 feet of drifts, crosscuts, opencuts; all largely caved. Idle. (Aubury 04:13t, 15t; Brown 16:510, Tucker 29:47; Tucker, Sampson 33:276t, 331, 333; Tucker, Sampson, Oakeshott 49:267t).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Southern Golden claim				See Ferris mine.
347	South Rand prospect	SW¼NW¼ sec. 15, T30S, R40E, MDM, Rand dist., 4½ miles southwest of Randsburg, on southeast slope of Rand Mts.	Grace Landes, 13061 Berrydale St., Garden Grove, and Lloyd Slettebak, 17241 Stagg St., Van Nuys (1958)	Two quartz veins about 80 feet apart in schist; strike approximately east, dip 45°-75° S. South vein is steepest and is most extensively explored. Trace along surface is about 300 feet long; width ranges from 1 to 2 feet. Locally, the veins are along walls of rhyolite dikes.	Eighty acres of patented land and 6 unpatented claims. Developed by 110-foot vertical shafts and two 70-foot shafts on western part of south vein, a 30-foot vertical shaft about 50 feet to east of main shaft, and an east-driven 50-foot drift adit about 200 feet farther east. Other short drifts and shallow pits on both veins. Production undetermined; probably small. Long idle. (Hulin 25:143; Tucker 23:169-170).
	Sovereign	Clear Cr. dist.			See Mammoth.
	Sparkplug; Sparkplug No. 2 claims				Former claims of Goler Cyn. Placer deposits; now part of Putnam group. (Tucker, Sampson 33:306-307).
	Speedy	Reported approx. NW¼ T27S, R32E, MDM, (1896); not confirmed, 1957	Undetermined, 1957; Fred Tibbetts, Isabella (1896)	Twenty-inch vein in granitic rock.	Uncorrelated old name. Probably abandoned. (Crawford 96:196).
	Spokane	Reported in sec. 33, T29S, R40E, MDM, Rand dist., west of Randsburg (1904); not confirmed, 1957	Undetermined, 1957; Wm. Bouchard and Hansen, Randsburg (1904)	Quartz vein in granitic and metamorphic rock.	Uncorrelated old name; may be property listed herein under different name. One 30-foot shaft and 50-foot tunnel. (Aubury 04:15t).
	Standard	Reported in sec. 25, T26S, R32E, MDM (1904); not confirmed, 1957	Undetermined, 1957; Thomas Kearney, Isabella (1904)	Quartz vein in granite.	Uncorrelated old name; probably long abandoned prospect (Aubury 04:15t).
	Standard group	Reported in sec. 3, T28S, R32E, MDM, Clear Creek dist. (1904); not confirmed, 1958	Undetermined, 1958; John Hayes, Havilah (1904)	Three 1-6 foot veins strike NE., dip S.; in granitic rock.	Uncorrelated old name. Probably long abandoned. (Aubury 04:15t).
348	Standard group (Exposed Treasure, Standard)	Most of the NE¼ of sec. 32, T11N, R12W, Mojave dist., on Standard Hill, 3 miles south of Mojave	Standard Hill Mines Co., Earl Blickenstaff, pres., P.O. Box 392, Mojave (1958)	Several northwest-striking veins, dip east; in rhyolitic porphyry and quartz monzonite.	See text. (Aubury 04:10t, 16t, 17t; Brown 16:493, 504-505; DeKalb 07:310-319; Eric 48:255t; Haley 22:42; Julihn, Horton 37:4, 25-27; Newman 23:221, 307; 23b:97-98; Trask, Wilson, Simons 43:123t; Trask, et. al, 50:84; Tucker 23:157, 160-161; 29:33-34; Tucker, Sampson 33:273t, 279, 284, 301-302; 34:11; 35:465, 468-469, 474; Tucker, Sampson, Oakeshott 49:218, 219, 258t).
	Stanford group				See Gold Coin group (Aubury 04:15t; Boalich, Castello 18:14t; Brown 16:510-511; Hess 10:45; Jenkins 42:331t; Tucker 29:47; Tucker, Sampson 33:276t; Tucker, Sampson, Oakeshott 49:267t).
	Stardust claim				Placer claim of Jewell group; now known as Big Dipper claim (Dibblee, Gay 52:61t).
349	Stardust No. 1 prospect	E½SW¼ sec. 32, T27S, R40E, MDM, Rademacher dist., 6 miles south of Ridgecrest	Dean P. Middleton, Sr., address undetermined (1957)	Well developed shear zone about 5 feet wide in quartz monzonite; strikes N. 50° E., dips 65° NW. Along footwall of shear zone is 8-inch-wide layer of brecciated quartz monzonite which is moderately stained with copper, iron, and manganese oxides.	Explored in inclined shaft of undetermined depth and small prospect pits. A prospect, idle.
	Starlight claim				Formerly claim in Echo and Lodestar Mining Co. groups; now part of Golden Queen mine. (Aubury 04:15t; Julihn, Horton 37:7, 20-21, fig. 5).
350	Star Lode prospect	NE¼ sec. 15, T28S, R40E, MDM, Rademacher dist., 8½ miles south of Ridgecrest, 2 miles northwest of Searles	B. M. Powell, address undetermined (1957)	A 12-inch-wide white quartz vein about 400 feet long; strikes N. 20° E., dips 35° NW.; in quartz monzonite.	Developed by short, inclined shaft and several crosscut trenches. A prospect; idle.
	St. Charles mine				See Rand group in text. (Crawford 96:196, 198; Goodyear 88:316; Tucker, Sampson 33:276t; Tucker, Sampson, Oakeshott 49:268t).

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
351	Stellar mine	S½NE¼ sec. 22, T27S, R40E, MDM, Rademacher dist., 3½ miles south-southeast of Ridgecrest	Anton Flink, Gen. Del., Ridgecrest (1957)	Quartz veins, as much as 4 feet wide but an average width of 2 feet; in quartz monzonite; strike N. 60° E. and dip 65° SE. Ore shoots occur mostly at or near intersections of quartz veins with rhyolitic and dioritic dikes which trend N. 30° W. Largest ore shoot mined was 100 feet long and 20 inches wide and yielded ore reported to contain half an ounce of gold per ton (Tucker and Sampson, 1933, p. 327). Free gold occurs with copper and iron sulfides in quartz.	Four unpatented claims. Developed by 3 shafts; an 80-foot shaft and a 110-foot shaft (both caved); and a 200-foot shaft filled below a depth of 80 feet. The 50-foot level of the 200-foot shaft extends 150 feet to the southwest and is the area from which nearly all of the ore has been mined. Production undetermined but probably not large. Idle since about 1933. (Tucker, Sampson 33:276t, 327; Tucker, Sampson, Oakeshott 49:232, 267t).
	Stellar	Reported in T27S, R32E, MDM, not confirmed, 1957	Undetermined, 1957; Mrs. Gus Miller, et al, Havilah (1933)		Uncorrelated old name. May be listed herein under other name. (Tucker, Sampson 33:276t).
	Still Lower Half No. 2	Reported in sec. 12, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904) not confirmed, 1958	Undetermined, 1958	Placer gold in alluvium.	Uncorrelated old name. Probably listed herein under different name. (Aubury 04:18t).
352	St. John mine	NE¼ sec. 4, T29S, R35E, and sec. 33, T28S, R35E, MDM, 16 miles southeast of Weldon, on south side of road over divide on north end of Kelso Valley	Karl Struss and Ethel Struss, 1343 N. Orange Grove Ave., Los Angeles 46 (1956)	Gold- and sulfide-bearing quartz vein in granodiorite.	See text (Aubury 04:15t; Tucker 29:47-48; Tucker, Sampson 33:276t, 279, 280, 327-328; 40:37; Tucker, Sampson, Oakeshott 49:233, 268t).
	St. Lawrence Rand (Isabella) mine				See under silver.
	St. Louis	Reported in sec. 21, T28S, R40E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; E. J. Holloway, Randsburg (1904)	Quartz vein in granite.	Uncorrelated old name; may be property listed herein under different name. A 50-foot inclined shaft and a 15-foot drift adit. (Aubury 04:15t).
	Stringer district placer mines				See text under tungsten
353	Summit prospect	NE¼ sec. 25, T28S, R35E, MDM, north slope of Pinyon Mt. 16 miles southeast of Weldon	Undetermined, 1957; Charles Mills, address undetermined (1937)	Poorly exposed quartz stringers in quartz monzonite.	Four short prospect adits. Long idle.
	Summit Diggings mines				See Summit Diggings Placer mines. (Hulin 25:147-148; Tucker 29:44, 47-48; Tucker, Sampson 33:279).
354	Summit Diggings Placer (Miller, Olympic, Oro Fino, Summit Gold Placers) mines	Secs. 1, 12, T29S, R40E, and sec. 6, T29S, R41E, MDM, 4 3/4 miles northeast of Randsburg, on south edge of Summit Range	Numerous holdings	Older alluvium and reworked older alluvium. Principal source of gold is reworked alluvium which is 2 to 10 feet thick and contains from 35¢ to $1.00 of gold per cu. yd.	Most extensive holdings were in secs. 1 and 12 in Kern County but main diggings are in San Bernardino County in secs. 6 and 36. Gold was discovered in 1893 and was mined for short periods in 1890's and in 1930's. Intermittent periods of mining at other times. Most of gold recovered by dry concentration in small machines. (Haley 23:156, 158-159; Hulin 25:147-148; Tucker 29:44, 48-49; Tucker, Sampson 33:276t, 279, 322, 328; Tucker Sampson, Oakeshott 49:265t, 268t).
	Summit prospect				See Doble mine (Brown 16:511).
	Sumner (Big Blue-Sumner; Sumner and Big Blue) mine	NW¼ sec. 28, T25S, R33E, MDM, Cove dist., 2 miles southwest of (new) Kernville, west side of Lake Isabella	Kern Development Co., C. S. Long, pres., P.O. Box 157, Hayward. Leased to Kern Mines Inc., Roland Toggnazzini, pres., 260 California St., San Francisco (1955)	Quartz veins in shear zone in granodiorite and alaskite.	See Big Blue group in text. (Aubury 04:15t; Brown 16:482, 487-488, 509, 511; Crawford 94:147; Goodyear 88:313, 314, 315, 321; Newman 23:146-147; Prout 40:382, 385, 390, 392, 394; Tucker 24:35, 36, 40; 29:27-28, 49; Tucker, Sampson 33:276t, 278, 280, 289-291; 34:313; 40:28; 40b:323, 324, 329; Tucker, Sampson, Oakeshott 49:268t).
	Sun group	Reported in Goler mining district (1933); not confirmed, 1958	Undetermined, 1958; Sarah Slocum, Garlock (1933)	Described as vein 3 feet wide in schist. Vein strikes east and dips 70° S.	Uncorrelated old name. Development consisted of a 600-foot west-driven drift adit. (Tucker, Sampson 33:328-329).
355	Sunbeam prospect	NE¼ sec. 26, T29S, R40E, MDM, Rand dist.; 1¼ miles northwest of Johannesburg, on east side of paved road	Frank R. and Myra S. Meadows, 801 McCarthy Court, El Segundo (1957)	Iron-stained shear zones a few inches wide in schist. Shear zones are irregular and of short lateral extent.	Five claims. Numerous shallow inclined shafts, short drift, and crosscut adits and trenches. No recorded production. Long idle.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Sun Flower prospect	Approx. sec. 36, T26S, R31E, MDM, Greenhorn dist., 1 mile east of Davis Guard Sta., not confirmed, 1957	Bishop & Downing (1957) (address undetermined)	Vein in granitic rock.	No recorded production. Idle.
356	Sunnyside prospect	Center, east margin sec. 11, T28S, R40E, MDM, Rademacher dist., 7½ miles south, southeast of Ridgecrest	A. E. Condy, 248 Spencer, Glendale (1949)	Two to 4-foot-wide quartz-filled shear zone strikes N. 10° W., dips 70° NE.; in quartz monzonite.	Developed by 60- to 80-foot shaft. A prospect; long idle.
357	Sunrise (Jennie Lind, New World) group	Sec. 10, T28S, R32E, MDM, Clear Cr. dist., one mile west of Havilah	Undetermined, 1957; Mrs. Hallah Miller, Havilah (1949)	Series of parallel quartz veins strike NE., dip 85° SE.; in granitic rock. Veins range in width from 1 to 3 feet.	Mined mostly before 1900; produced over $10,000 in gold and silver from undetermined tonnage. Comprises 3 patented claims. (Aubury 04:14t; Crawford 96: 196; Tucker, Sampson 33:329; Tucker, Sampson, Oakeshott 49:233, 234, 268t).
358	Sunrise mine	SE¼ sec. 35 T28S, R40E, MDM, Summit dist., 5 miles northeast of Randsburg, Summit Range	George Blatt, P.O. Box 213, Johannesburg; lives on property (1958)	Angular to sub-angular particles of gold which range in size from very fine particles to ¼ inch in length. Average value of gold-bearing gravels in channels is about $1.00 per cu. yd.; ranges from less than 50¢ to $5.00 per cu. yd. Gold is commonly coated with clayey material. Gravel is moderately- to poorly cemented with caliche. Best values in gold are near base of gravels, on false bedrock in gravels, (caliche-rich layers) and in channels of present streams that contain reworked gravels. Probably few thousand cu. yds. of low grade unworked remnants of gravel. Maximum thickness of gravel is about 20 feet. Bedrock is composed of Tertiary sedimentary and volcanic rocks.	Placer claim. Mined in the 1930's with power equipment; output undetermined. Owner mines gold-bearing gravels from small pits and trenches and recovers gold in dry-concentrator or in small sluice when water is available. Dry concentrator can handle about 2 cu. yds. per man day.
	Sunrise mine				See High Grade group. (Brown 16:492; Tucker 29:45; Tucker, Sampson 33:273).
	Sunset	Reported in sec. 10, T27S, R32E, MDM, about 2 miles west of Bodfish (1916); not confirmed, 1958	Undetermined, 1958; C. E. Pierrel, Bodfish (1916)	Eight inch to 2-foot-wide vein strikes NW., dips 40° SW.; in granitic rock.	Uncorrelated old name. Probably abandoned. Workings consisted of 230-foot drift adit. (Brown 16:511; Tucker, Sampson 33:276t; Tucker, Sampson, Oakeshott 49:268t).
	Sunset	Reported approx. T25S, R29E, MDM, 3 miles southwest of White River (1916); not confirmed	Undetermined, 1957; M. Mitchell, Ducor (1916)	Seven to 18-inch-wide vein strikes N. 70° E., dips 55° N.; in metamorphic rocks.	Uncorrelated old name. Probably abandoned. Formerly described in Tulare County. Developed by 175-foot adit, short adits, shallow shafts. (Crawford 94:298; 96:197, 471; Franke 30:442; Laizure 23:527; Tucker 19:915).
359	Sunset Placer mine	SW¼ sec. 33, T27S, R31E, MDM, about 25 miles northeast of Bakersfield on the Kern R., one mile above Democrat Springs	Mr. Wm. S. Fewell, Kern River route (1958)	Four to 8-foot thickness of auriferous Recent river gravel. Contains traces of scheelite. Granitic bedrock.	Formerly ground sluicing operation. Small production during 1930's. Idle since 1939 (Tucker 29:49).
360	Sunshine mine	NE cor. sec. 11, T30S, R40E, MDM, Stringer dist., 1 3/4 miles south-southeast of Randsburg	T. A. Atkinson estate, A. P. Barnhart, agent Bakersfield (1957)	Gold-bearing vein in schist.	See text. (Aubury 04:15t; Boalich, Castello 18:12t, 13t; Brown 16:512, 522t; Hulin 25:81, 82, 83, 84, 86, 87, 144; Partridge 41:290; Tucker 29:49; Tucker, Sampson 33:276t, 280t, 286, 329; Tucker, Sampson, Oakeshott 49:268t).
361	Sunshine claim	SE¼NW¼ sec. 34, T28S, R38E, MDM, El Paso Mts., in Bonanza Gulch, north of Last Chance Cyn.	Harris Lane, Shirley Lane, C. E. Mulford, San Fernando (1958)	Fine to coarse gold in Quaternary terrace gravels and in Recent talus and stream gravels. Bedrock is sedimentary rocks, auriferous, in part, of the Goler formation (Paleocene). Gold occurs at base of gravels, which, in most places, is beneath several feet of barren gravels. Extent and grade of deposits undetermined.	One 60-acre placer claim. Developed by many small excavations to bedrock. Production undetermined. Most of the claims in Bonanza Gulch have been sources of placer gold since the 1890's. Principal production was in the 1890;s and 1930's. Small quantities of gold are recovered annually by small-scale dry washing methods.
	Surplus	Reported in secs. 7, 18, T28S, R34E, Piute Mts. (1904); not confirmed, 1957	Undetermined, 1957; J. B. Ferris, Caliente (1904)	Gold and sulfides in quartz vein in granite.	Uncorrelated old name; may be property listed herein under different name. (Aubury 04:16t; Crawford 96:197).
362	Surprise prospect	Central south border sec. 31, T28S, R34E, MDM, Piute Mts. area, 1 3/4 miles northeast of Claraville, just west of George Lodge	Ed and Anna George, Bodfish (1953) James G. Cooney, et al, Law Bldg., 139 No. Broadway, Los Angeles 12 (1954)	Quartz veins, 8 in. to 2 feet wide strike N. 40° E., dip to 70° SE.; in deeply-weathered granitic rock.	Explored by shallow shafts and 2 adits 100 feet long, all inaccessible in 1955 because of extensive caving. Long idle. Production, if any, undetermined. (Tucker, Sampson 33:276t, 329; Tucker, Sampson, Oakeshott 49:234, 268t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Surprise	Reported in sec. 31, T10N, R13W, SBM, (1904) not confirmed, 1958	Undetermined, 1958; McKell & Gerner, Randsburg (1904)	Two 3-foot veins strike N., vertical, in porphyry.	Uncorrelated old name. Probably abandoned. (Aubury 04:16t).
	Tam O'Shanter	Reported in sec. 13, T30S, R40E, MDM, Stringer dist., south of Randsburg (1904); not confirmed, 1957	Undetermined, 1957; Larick and Rankin, Randsburg (1904)	Numerous quartz stringers in schist. Free milling.	Uncorrelated old name; may be property listed herein under different name. Two incline shafts 65 feet deep, 20-foot open cut, 150 feet of drifts. (Aubury 04:16t).
	Tennessee claim				Patented claim of the Yellow Aster mine. (Crawford 96:194, 197).
	Terre Marie	SW¼ sec. 36, T29S, R40E, MDM, Johannesburg	Undetermined, 1957; Mr. Benson, Randsburg (1904)	Four quartz veins, 2 feet wide, in schist; strike N. dip E.; free milling.	Developed by 50-foot inclined shaft and 350 feet of drifts. See Grannis Land Co. (Aubury 04:16t).
	Three Chimneys	Reported 4 miles south of Isabella (old site) (1896); not confirmed, 1957	Undetermined, 1957	Eight-inch-wide quartz vein in granite.	Uncorrelated old name; may be listed herein under different name. Developed by 400-foot tunnel and several short winzes by 1896. (Crawford 96:197).
	Tiger	Reported in sec. 29, T27S, R33E, MDM, southeast of Bodfish (1904); not confirmed, 1957	Undetermined, 1957	Gold-bearing quartz vein with galena and sulfides, in granite	Uncorrelated old name; may be listed herein under different name. (Aubury 04:16t).
	Tip Top	Reported in sec. 14, T27S, R32W, MDM, Clear Cr. dist., about 4½ miles north of Havilah (1904); not confirmed, 1958	Undetermined, 1958; John Hayes, Havilah (1904)	Vein strikes NE., dips vertically; in granitic rock.	Uncorrelated old name. Probably long abandoned prospect. (Aubury 04:16t; Crawford 96:197).
	Tip Top	Reported in sec. 14, T30S, R33E, (?), MDM, Loraine dist. (1896); not confirmed, 1958	Undetermined,1958; J. B. Ferris, Caliente (1896)	Two-foot-wide, steeply-dipping quartz vein.	Uncorrelated old name. Probably long abandoned prospect. (Crawford 96:197).
	Tip Top claim				Claim of Queen Esther mine (see Golden Queen mine in text). (Tucker 23:162; Tucker 33:282; 35:fig. 7).
	Tom Cat claim				Patented claim of the Yellow Aster mine. (Aubury 04:16t).
	Tom Lane mine				Former name of part of Big Blue group. (Watts 93:238).
	Top of the World mine				See under antimony. (Jenkins 42:330t; Tucker, Sampson 43:61-62; Tucker, Sampson, Oakeshott 49:275t).
	Topsy	Reported in sec. 36, T29S, R40E, MDM, vic. Johannesburg (1933); not confirmed, 1957	Undetermined, 1957		Uncorrelated old name; probably long abandoned claim. (Tucker, Sampson 33:276t).
	Trent mine				See Middle Butte mine (Julihn, Horton 37:4, 32, 33; Tucker, Sampson 35:467, 468).
	Trestle mine				See French mine.
	Trilby claim				Patented claim of the Yellow Aster mine. (Aubury 04:18t; Crawford 96:194, 197).
	Trio	Reported in vicinity of Mojave dist.	Undetermined, 1958		Uncorrelated old name. May be described herein under another name. (Tucker 20:34).
363	Tropico (Big Three, Big Tree, Fairview, Hamilton, Lida, Piute) mine	S½ sec. 11, N½ sec. 14, NE¼ sec. 15, SE¼ sec. 10, T9N, R13W, SBM, Mojave dist., on Tropico Hill, 4 miles northwest of Rosamond	Cliff G. Burton, Rosamond (1958)	Four east-trending veins dip south in rhyolite.	See text. (Aubury 04:8t, 10t, 11t, 12t; Brown 16:512; Eric 48:256t; Haley 22:46; Tucker 21:310; 23:155; 29:39, 50, 51; 35:482-484; Tucker, Sampson 33:275t, 276t, 279, 280, 330-332; 34:317; 40:37, 38; Tucker, Sampson, Oakeshott 49:234, 235, 269t).
	Turner	Reported in secs. 5, 6, T10N, R12W, SBM, Mojave dist., (1904); not confirmed, 1958	Undetermined, 1958; Trepanier & Eckley, (1904)	Six-foot-wide quartz vein, strikes generally north, dips east; in quartz monzonite and rhyolitic rocks.	Uncorrelated old name. Probably described herein under another name. (Aubury 04:16t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Twin Brothers	Reported in sec. 12, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958	Placer gold in alluvium.	Uncorrelated old name. Probably listed herein under different name. (Aubury 04:18t).
	Two to One claim	Reported to be about 3 miles southeast of the railroad station at Tehachapi (1888). Probably approximately sec. 6, T11N, R14W, SBM	Undetermined; probably on a private ranch	Free gold in coarse stream gravels composed mostly of granitic debris.	Described as an "old" placer mine in 1888. Reported to have yielded an average of $6 to $8 in gold per man per day by dry recovery methods. (Goodyear 88:311).
	Uncle Sam claim				See Southern Cross group. (Tucker, Sampson 33:331-333; Tucker, Sampson, Oakeshott 49:235-236, 269t).
	Union	Reported in vicinity of Big Blue group, Cove dist., 1888; not confirmed, 1958	Undetermined, 1958	Six inch to 5 foot vein strikes N. 53° W.	Uncorrelated old name. Probably listed herein under another name. Originally developed by 317-foot inclined shaft. (Goodyear 88:321).
	Upper Sageland prospect	Reported in sec. 19, T28S, R35E, MDM, Sageland dist., 14 miles south-southeast of Weldon (1948); not confirmed, 1958	Undetermined, 1958; Upper Sageland Mining Co., Mojave (1937)		Developed by 175-foot shaft and 250 feet of drifts in 1937. Yielded few tens of ounces of gold and silver and few pounds of copper in 1937. Idle since 1937. (Eric 48:256t).
	Up to Date	Reported in sec. 10, T30S, R40E, MDM, southwest of Randsburg (1904); not confirmed, 1957	Undetermined, 1957; C. C. Bowles Randsburg (1904)	Quartz veins in schist.	Uncorrelated old name; probably long abandoned claim. Developed in 1904 by 10-foot vertical shaft, 10-foot and 15-foot inclined shafts, and 50-foot open cut. (Aubury 04:16t).
	Urbana claim	NE¼ sec. 28, T25S, R33E, MDM, Cove dist., 2 1/3 miles southwest of (new) Kernville, west side of Lake Isabella	Kern Development Co., C. S. Long, pres. P.O. Box 157, Hayward. Leased to Kern Mines, Inc., Roland Toggnazzini, pres., 260 California St., San Francisco (1955)	Quartz veins in granodiorite.	See Big Blue group in text. (Aubury 04: 16t; Brown 16:512-513; Crawford 94:147; Newman 23:147; Prout 40:393, 416-417; Tucker 24:39; 29:51; Tucker, Sampson 33:276t, 320-321; Tucker, Sampson, Oakeshott 49:269t).
	Valley claim				Former claim of Whitmore mine. (Tucker 23:162).
364	Valley View mine	SW¼ sec. 3, SE¼ sec. 4, T28S, R33E, MDM, Piute Mts., on north side of Clear Cr., ¼ mile south of Bodfish-Claraville road, 6 miles southeast of Bodfish	A. L. Brown and Arthur Brown, 4703 Westdale Ave., Los Angeles 41 (1958)	Gold irregularly distributed in quartz veins in biotite quartz diorite. Several parallel veins from 3 to 6 feet wide strike N. 50° E. and dip 40° NW. Two veins developed by underground workings. Owners report some scheelite and antimony in veins; gold ore assays $20 to $40 per ton.	Fifteen unpatented lode claims and 5 patented lode claims. A 385-foot drift adit driven northeast on No. 1 vein, and 90-foot northeast-driven drift adit on No. 2 vein (24 feet west of No. 1 vein). A 90-foot shaft sunk on No. 1 vein at 200 feet north of No. 1 portal. Some mining in 1907-1912 when ore was trammed to mill in Clear Creek below mine. Production undetermined but reported by Tucker to be at least $28,000 (1949, p. 236). (Tucker, Sampson, Oakeshott 49:236, 269t).
	Valverde				See Operator Divide mine. (Brown 16: 507).
	Venus				See Porter group. (Tucker, Sampson 33:299-300).
	Veracity	Reported 1 mile east of Claraville (1896); not confirmed, 1958	Undetermined, 1958 Barton and Patterson, Weldon (1896)	Quartz vein in granite strikes N. 67° E., and dips 65° SE. About 2 feet wide with free gold and sulfides.	Uncorrelated old name. Probably long abandoned prospect. Idle in 1896. (Crawford 94:147-148; 96:197).
365	Vera Queen (Indian Wells Valley) group	NE cor. NW¼ sec. 22, T27S, R40E, MDM, Rademacher dist., 3 miles south of Ridgecrest	A. De Mayo, P.O. Box 14, Ridgecrest (1957)	Quartz vein, 1 to 3½ feet wide, strikes N. 80° E., dips 55° S.; in granodiorite. The vein contains free gold, iron and manganese oxides, pyrite, and chalcopyrite. Vein is exposed on surface for about 400 feet and crosses two large north-trending rhyolite dikes.	One claim (part of the ground formerly held in Indian Wells Valley group). Developed by a 200- to 300-foot drift adit driven east from west base of hill, 35-foot and 50-foot shafts east of portal of drift, several shallow trenches, and a 500-foot crosscut adit driven south from the north base of the hill. South-driven crosscut adit was not extended to the vein. Proposed intersection is east of end of east-driven drift adit. Probably minor production. Long idle. (Tucker, Sampson 33:274t, 310; Tucker, Sampson, Oakeshott 49:261t).
	Vestry prospect				See Punkie prospect.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Victor claim				Former claim of Yellow Dog group. (Tucker 23:162).
	Victoria mine				See Pine Tree mine (Aubury 04:16t).
	Victory claim				Claim of Standard group. (Tucker 23: 164).
	Victory No. 2 claim				Placer claim of Super Mold Corp. of California. See Stringer District mines under tungsten in text. (Averill 46:260).
	Victory Wedge mine				See Pearl Wedge mine.
	Viola	Reported in. sec. 21, T28S, R32E, MDM, (1904); not confirmed, 1957	Undetermined, 1957		Uncorrelated old name. (Aubury 04:16t).
	Virginia prospect	Sec. 25, T26S, R32E, MDM, Keyes dist., 1¼ miles northwest of new Isabella	Undetermined, 1957	Vein(?) in quartz diorite which is mantled by alluvium. No surface expression.	Shallow surface cuts. No recorded production. Idle.
	Voss Consolidated Placer mines				See Klondike group (Dibblee, Gay 52:61t; Tucker 29:51; Tucker, Sampson 33:276t; Tucker, Sampson, Oakeshott 49:269t).
	Vulcan claim				Claim of Red Wing mine.
	Vulture	Reported in sec. 36, T30S, R36E, MDM (1904); not confirmed, 1957	Undetermined, 1957; C. C. Calkins and L. E. Potter, Los Angeles (1904)	Gold, silver, lead, and copper sulfides in veins in limestone and diorite.	Uncorrelated old name; probably long abandoned prospect; not found. (Aubury 04:16t).
366	Wade H. No. 2 claim	NE¼ sec. 1, T30S, R40E, MDM, Rand dist., 3/4 mile south of Johannesburg, adjacent to paved road	Frank W. Royer, Red Mountain (1957)	Shear zone strikes N. 65° W., dips 80° S.; in kaolinized quartz monzonite and rhyolite.	Part of patented group, see also W. H. No. 1 mine. Two shafts of undetermined depth. Probably no production.
	Wagman & McFarland mine				See Yellow Dog mine (Newman 23:220).
	Walker	Reported on Kern River, 4 miles south of Isabella (old site) (1896); not confirmed, 1957	Undetermined, 1957	Gold-bearing gravel 4 feet deep.	Uncorrelated old name. Worked by ground sluicing in 1896. Water was taken from French Creek in 5-mile-long ditch. Production undetermined. (Crawford 96: 197).
	Wall Street prospect	Reported in sec. 35, T27S, R40E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; Underwood and McNitt, Bakersfield (1904)	Quartz vein with copper and gold in granite.	Developed by 100-foot shaft. May be Bellflower mine. (Aubury 04:16t; Tucker, Sampson, Oakeshott 49:269t).
	Wall Street group				See Doble mine (Tucker, Sampson 33:276t, 333).
367	Warrington (Little Angel) mine	NE¼ sec. 9, T28S, R32E, MDM, Clear Cr. dist., 1 3/4 miles west of Havilah, 1 mile southeast of O'Brien Spring	George and Charles Fluhart, Kernville (1957)	Narrow high-grade quartz vein, in quartz diorite, striking generally N. 40° E., and dipping 70° SE. Free gold associated with pyrite and arsenopyrite.	One of the earlier mines in the district, yielded an undetermined amount of gold, mainly from free milling ore. Workings consist of two shafts several hundred feet deep and several thousands of feet of horizontal workings, all of which are largely caved. A 20-ton cyanide plant once was operated, parts of which still remain on the property. Idle. (Aubury 04:16t, 17t; Crawford 94:148; 96:197; Tucker, Sampson 33:333; Tucker, Sampson, Oakeshott 49:269t; Watts 93: 238).
	Wasp				Former claim of Ashford Mines. (Crawford 96:197).
	Water (Portuguese, Wood and Water)	Reported on Kern River, 4 miles south of Isabella (old site) (1896); not confirmed, 1957	Undetermined, 1957	Gold-bearing vein in granite is from 6 inches to 2 feet wide.	Uncorrelated old name. Developed in 1896, by 100-foot shaft and 100 -foot drift at bottom. Ore extracted in 1896 from cut on surface 15 feet deep and 200 feet long. May be listed herein under different name. (Aubury 04:16t; Crawford 96:197).
368	Waterhole (David King and Tango) prospect	SE¼ sec. 3, T29S, R34E, MDM, Piute Mts. area, 1 1/8 mile southeast of Claraville, on west side of Kelso Cr. tributary	Louis Perrant, P.O. Box 4, Claraville (1955)	Gold-bearing quartz vein, 6 to 18 inches wide, strikes N. 55° E., dips 60° SE.; in weathered granitic rock. Pyrite and galena present. Kelso Cr. tributary adjacent to mine contains placer gold deposits.	Developed by several shafts 50 to 60 feet deep, and adits driven southwest reported to be 50 and 130 feet long, but inaccessible in 1955. Placer deposit formerly worked by small-scale placer methods. Production, if any, undetermined, idle in 1955. (Tucker, Sampson 33:273t, 297; Tucker, Sampson, Oakeshott 49:256t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Water Right	Reported in sec. 12, T29S, R39E, MDM, Goler dist., El Paso Mts. (1904); not confirmed, 1958	Undetermined, 1958; V. C. Brodarson, Randsburg (1904)	Placer gold in alluvium.	Uncorrelated old name. Probably listed herein under different name. (Aubury 04:18t).
	Watkins group	Reported in sec. 35, T28S, R39E, MDM, El Paso Mts., 9 miles northwest of Randsburg (1949); not confirmed, 1958	Undetermined, 1958; W. P. Watkins, Randsburg (1949)	Gravels, 12 to 20 feet deep, in Slate Gulch, an east-draining tributary to Goler Cyn. Bedrock is sandstone of the Goler formation.	Four 160-acre placer claims in 1949. Probably no production. Idle since 1949. (Tucker, Sampson, Oakeshott 49:236, 269t).
	Webb claim				Patented claim of Long Tom mine (Tucker, Sampson 33:316).
	Wedge claim				Patented claim of Standard group. (Aubury 04:16t; Tucker 23:160; Tucker, Sampson 33:276t; Tucker, Sampson, Oakeshott 49:269t).
369	Wegman (Eureka, Grace group, Karma) group	NE sec. 6, T10N, R12W, SBM, Mojave dist., 4½ miles southwest of Mojave on the northeast slope of Soledad Mt.	Bert Wegman, P.O. Box 195, Randsburg (1958)	Five sub-parallel quartz veins strike about N. 20° W., dip steeply NE.; in rhyolitic volcanic rocks.	See text. (Aubury 04:8t, 10t; Brown 16:497, 499; Julihn, Horton 37:4,22; Tucker 23:161; 29:37; 35:465, 468, 469, 479-480; Tucker, Sampson 33:272t, 274t, 279, 280, 282, 283, 311; 40:11, 30, 34, 35; Tucker, Sampson, Oakeshott 49:218, 227, 257t).
	Wells Fargo (Old Mojave)	Reported in sec. 36, T29S, R40E, and sec. 1, T30S, R40E, MDM, 1 mile southeast of Randsburg (1904); not confirmed, 1957	Undetermined, 1957; J. S. Warner, Johannesburg (1904)	Quartz veins in granitic rocks.	Uncorrelated old name; may be property listed herein under different names. (Aubury 04:16t).
	West End mine				See Big Gold mine. (Tucker, Sampson 33:291-292).
370	Western (Hematite) prospect	E½NE¼ sec. 8, T10N, R13W, SBM	William Harwood, address undetermined) (1955)	Vein in rhyolitic volcanic rock strikes NW., dips SW.	Developed by 50-foot adit driven S. 45° W. with 20-foot inclined winze at 25 feet; shallow inclined shaft 60-foot northwest of adit; 50-foot vertical shaft 100 feet southeast of adit, directly in front of portal of a second adit driven 20 feet southwest. (Julihn, Horton, 1937, p. 36).
	Whipperwill	Sec. 35, T29S, R40E, MDM, Rand dist., Randsburg	Undetermined, 1958; Frank Wycoff Randsburg (1933)		Uncorrelated old name. Probably Whip-oor-will claim of Yellow Aster mine. (Tucker, Sampson 33:276t).
	White mine	Rand dist.			See Sidney mine. (Tucker 29:51; Tucker, Sampson 33:276t,333-334; Tucker, Sampson, Oakeshott 49:269t).
	White Pine	Reported on Bodfish Cr. 9 miles northeast of Havilah (1896); not confirmed, 1957	Undetermined, 1957	Two-foot-wide vein between limestone and granite.	Uncorrelated old name. Developed by 100-foot tunnel before 1896. May be listed herein under different name. (Aubury 04:16t; Crawford 94:148; 96:199-198, 199).
371	White Star prospect	East cors. sec. 18, 19, T27S, R40E, MDM, Rademacher dist., 4 miles southwest of Ridgecrest	Undetermined, 1957; P. Erdman, Inyokern (1949)	Quartz vein in granitic rock.	A 60-foot inclined shaft. Idle. (Tucker, Sampson 33:276t, 334; Tucker, Sampson, Oakeshott 49:269t).
	White Star	Reported in sec. 11, T27S, R32E, MDM, Pioneer dist., about one mile west of Bodfish (1929); not confirmed, 1958	Undetermined, 1958; E. A. Braden, Bodfish (1929)	Ten inch vein in granitic rock. Ore shoot was 40 feet in length, 10 inches wide, a few tens of feet in height.	Developed by a 320-foot adit and 500 feet of drifts; 1000 ounces of gold recovered 1897-1910; no recorded production since. Probably now abandoned. (Brown 16:513; Tucker 29:51; Tucker, Sampson 33:276t; Tucker, Sampson, and Oakshott 49:269t).
372	Whitmore mine	Middle sec. 32, T11N, R12W, SBM, Mojave dist., 3 miles southwest of Mojave, on the flat southwest of Standard Hill	Whitmore Mine, Inc., Earl Oakley, pres., 408 S. Spring St., Los Angeles (1958)	Several parallel quartz-calcite veins in rhyolitic and granitic rock; strikes N. 30° W., dips 60°-80° E.	See text. (Gardner 54:55-56; Julihn, Horton 37:27-29; Tucker 23:157, 162, 163; 29:52; 35:469, 484-485; Tucker, Sampson 33:277t, 284, 334, 335; 40:11, 38; Tucker, Sampson, Oakeshott 49:236, 269t).
373	W. H. No. 1 mine	Approx. center sec. 1, T30S, R40E, MDM, Rand dist., 1¼ miles southeast of Randsburg	Frank W. Royer, Red Mountain (1957)	Quartz-bearing, nearly vertical, shear zone in schist. Strikes N. 20° W.; about 400 feet long on surface. Gold is fine-grained and free milling. Vein strikes into K.C.N. No. 1 claim to south.	Shaft at least 150 feet deep and few hundred feet of drift adits. Few hundred ounces of gold produced 1938-1939 from ore that contained nearly 1 oz. gold per ton.

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
374	Wildcat mine	SW¼ sec. 8, T28S, R40E, MDM, Rademacher dist., 8 miles south-southeast of Ridgecrest	Undetermined, 1957	Fault zone strikes N. 40° E., dips 65° NW.; in quartz diorite. Fault is from 2 to 8 feet wide, consists of parallel shears, and contains free gold, oxides of iron, manganese, and copper, and thin lenses of quartz. Fault zone is well-exposed and about 900 feet long; only part of the northern 400 feet of the zone has been mined.	Fault zone has been mined and explored from an inclined shaft of undetermined depth near the crest of a hill, and from a vertical shaft about 100 feet deep, 400 feet downslope to the northeast. Shorter inclined winzes and near-surface stopes have been driven between the shafts. Several tens of tons of material have been treated in a mill which has been removed. Probably small production. May be same as London mine (1904). Long idle.
	Wilhelmina				See Prospector. (Aubury 94:14t).
	Williams	Reported approx. NE¼ T27S, R31E, MDM, in Fremont Cr. (1896); not confirmed, 1957	Undetermined, 1957; Mr. Ben Williams, Woody (1896)	Recent gravels of Fremont Cr.	Uncorrelated old name. Probably abandoned. Worked by ground sluicing. (Crawford 96:198).
375	Will Jean prospect	SE¼ sec. 26, T26S, R32E, MDM, 3 miles north of Bodfish	Undetermined, 1957	Vein in granitic rock.	No recorded production. Idle.
	Willow placer	Reported in NW¼ sec. 27, T25S, R33E, MDM, Cove dist., 1 3/4 miles south of (new) Kernville, now below the highwater level of Lake Isabella; not confirmed, 1958	U. S. Army Corps of Engineers (1959)	Auriferous river gravel on schist and granodiorite bedrock. Pay zone said to be 6 feet thick.	A ground sluicing operation prior to 1914. Long idle. (Brown 16:513).
376	Windy mine	SW cor. sec. 25, T29S, R40E, MDM, Rand dist., 3/4 mile northwest of Randsburg	Stephen Reiss, Santa Barbara (1957)	Quartz stringers and iron-stained crushed schist along steep, northeast-dipping shear zones in schist. Free milling ore. Veins indistinct on surface except where exposed in cuts.	Several claims (1 patented). Developed by inclined shaft to undetermined depth below 225 feet. Few thousand feet of drifts on 4 levels to 200 foot level. Total production of few thousand ounces of gold in 1899, 1911-1915, 1926-1928, and 1931-1937. Idle since 1941. (Brown 16:513; Tucker 29:51-52; Tucker, Sampson 33:310, 335; 34:315; Tucker, Sampson, Oakeshott 49:236-237, 270t).
377	Winnie (Moren Sophie, Sophie Moren) mine	NE¼ sec. 11, T30S, R40E, MDM, Stringer dist., 2 miles south of Randsburg	Jack Leeder and LeRoy Petterson, addresses undetermined (1957)	Several parallel, approximately west-trending quartz stringers in schist. Western extension of stringers on Merced claim. Stringers contain both gold and scheelite.	Winnie mine is eastern part of Sophie Moren group of claims; adjoins west boundary of Merced claim. Total output from mine is several hundred ounces of gold and an undetermined amount of tungsten. Principal mining periods of gold were intermittent intervals between 1899-1909 and in the 1930's. Developed by shafts from 50 to 250 feet deep and probably a few hundred feet of drifts. Idle. (Aubury 04:16t; Boalich, Castello 18:13t; Brown 16:513, 522t; Hulin 25: 72, 84; Partridge 41:291; Tucker 29:52).
378	Yellow Aster (Olympus) mine	Center, NW¼ sec. 2, T30S, R40E, MDM, Rand dist., southwest edge of Randsburg	Yellow Aster Mining and Milling Co., 6331 Hollywood Blvd., Los Angeles (1958)	Free gold in schist and quartz monzonite. Several types of veins.	See text. (Aubury 04:8t, 9t, 10t, 12t, 13t, 15t, 16t, 17t, 185; Brown 16:483, 485, 514; Cooper 36:1-21; Crawford 96: 187, 188, 193, 194, 195,196, 197; Eric 48:257t; Frolli 40:1-46; Haley 22:46; Hess 10:31, 33-39; Hulin 25:65;72, 80, 81, 82, 84, 86, 87, 88-91, 108, 121-125; Jenkins 42:330t; Newman 23:105, 147, 539; Partridge 41:291; Tucker 20:34; 21:310; 29:52-54; Tucker, Sampson 33:272t, 277t, 279, 280, 335-338; 34:317; 40:11, 38-43; Tucker, Sampson, Oakeshott 49:237, 270t, 276t).
	Yellow Bank	Reported in sec. 33, T29S, R40E, MDM, Rand dist., west of Randsburg (1904); not confirmed, 1957	Undetermined, 1957; Bouchard and Thomson, Randsburg (1904)	Quartz veins in metamorphic and granitic rock.	Uncorrelated old name; may be property listed herein under different name. One 50-foot inclined shaft and 40 feet of open cuts. (Aubury 04:16t).
	Yellow Bank (Ruby-Reedley)	Reported in sec. 7, T28S, R39E, MDM, El Paso dist., (1904); not confirmed, 1957	Undetermined, 1957; Roberts, Jeffords, and Mathews, Randsburg (1904)	Quartz in granite.	Uncorrelated old name; may be property listed herein under different name. Developed by 4 shallow shafts, 150 feet of drift adits. (Aubury 04:16t).
379	Yellow Boy mine	W½ NE¼ sec. 19, T28S, R34E, north end of French Meadows, Piute Mts., 11 miles southeast of Bodfish	Undetermined, 1958; formerly part of Jenette-Grant mine (1940)		An old workings of which little is known. Shaft is caved and dumps and tailings are overgrown. Part of tailings reworked by Jenette-Grant Mining Co. in 1940. (Tucker, Sampson 40b:328; Tucker, Sampson, Oakeshott 49:270t).

GOLD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
380	Yellow Dog mine	W½ sec. 32, T11N, R12W, SBM, Mojave dist., 3 miles southwest of Mojave on the east side of a small hill west of Standard Hill	Yellow Dog Mining Co., Bert Wegman, pres., P.O. Box 195, Randsburg (1958)	Two to 15-foot-wide quartz-calcite vein strikes N. 20° W. dips 60° NE. in rhyolitic porphyry and granitic rock.	See text. (Eric 48:257t; Julihn, Horton 37:29-30; Newman 23:307, 308, 539; 23b:98; Tucker 63:157, 163, 164, 29:54, 55; 35:465, 469, 485; Tucker, Sampson 33:277t, 279, 284, 338, 339; Tucker, Sampson, Oakeshott 49:237-238, 270t).
	Yellow Dog Extension claim				Part of Standard group and Pride of Mojave (?). May be misnamed from Yellow Rover Extension. (Tucker 23:164; 29:55, 56; Tucker Sampson 33:277t; Tucker, Sampson, Oakeshott 49:270t).
	Yellow Jacket	Reported in sec. 20, T27S, R33E, MDM (1904); not confirmed, 1957	Undetermined, 1957		Uncorrelated old name; may be listed herein under different name. Probably in Randsburg area. (Aubury 04:16t).
	Yellow Rover mine				See Standard group. (Aubury 04:16t; Julihn, Horton 37:4, 27; Tucker 23:160).
381	Yellow Treasure mine	Center W½ sec. 26, T27S, R40E, MDM, Rademacher dist., 4 3/4 miles south of Ridgecrest	A. De Mayo, P.O. Box 14, Ridgecrest (1957)	Shear zone, several tens of feet wide and about a mile long, strikes N. 40° W., dips 75° NE.; in quartz monzonite. Within the shear zone are quartz veins from 3 to 6 feet wide and several tens of feet long which contain free gold, chalcopyrite, bornite, iron oxides and minor amounts of argentiferous galena. Ore zones are lenticular, discontinuous, and of variable grade. Some copper and gold along walls of rhyolitic dikes in the shear zone. Locally, ore zones are thin and closely spaced.	Three unpatented claims. Developed at southeast end of shear zone by 145-foot inclined shaft and a 450-foot drift to the southeast on the 140-foot level. Two short winzes and two short crosscuts also on 140-foot level. Shallow shafts and open cuts have been excavated farther northwest along the shear zone. Small amounts of gold and copper were produced from the main shaft area in the early 1930's early 1940's, and late 1940's. In 1957, copper-bearing lenses at the northwest end of the shear zone were being exposed in open cuts. (Eric 48:257t; Tucker, Sampson 33:339; Tucker, Sampson, Oakeshott 49:270t).
	Young America	Reported on Kern R. 4 miles south of Isabella (old townsite) (1896) not confirmed, 1957	Undetermined, 1957	Quartz vein in granite.	Uncorrelated old name; may be listed herein under different name. Probably some production before 1896 as was described then as having many old workings (Crawford 96:198).
	Yucca Tree claim				Patented claim of Santa Ana group. (Aubury 04:16t).
	Yukon	Reported in sec. 6, T10N, R12W, SBM, Mojave dist. (1904); not confirmed, 1958	Undetermined, 1958	Two to 4-foot quartz vein strikes NW., dips SW. in rhyolitic porphyry.	Uncorrelated old name. Probably now part of Golden Queen mine. (Echo group?) (Aubury 04:16t).
382	Yukon prospect	Sec. 31, T26S, R32E, MDM, Greenhorn dist., 2½ miles east of Davis Guard Sta.	Charles Ray (1957) (address undetermined)	Veins in granitic rock.	No recorded production. Idle.
	Zada mine				See Gold Peak mine under silver. (Aubury 04:16t; Brown 16:495, 496).
383	Zenda mine	SW¼ sec. 29, T30S, R33E, MDM, Loraine dist., on high ridge between Big Last Chance Cyn. and Studhorse Cyn.	Undetermined, 1958; Zenda Gold Mining Co., I. W. Hellman Bldg., Los Angeles (1949)	Vein, 30 to 50 feet wide, strikes N. 30° E., dips 40° NW. Quartz diorite footwall and rhyolite porphyry hanging wall.	See text. (Aubury 04:16t, 17t; Brown 16:515; Tucker 20:34; 23:156; 24:41-42; 29:56; Tucker, Sampson 33:277t, 339; Tucker, Sampson and Oakeshott 49:270t).
	Zig Zag				See Columbia. (Aubury 04:9t).
	Undetermined prospect	NW¼NW¼ sec. 9, T10N, R13W, SBM (projected)	Undetermined	Three to 6-foot-wide quartz vein strikes due east, dips 75° N.; in rhyolitic volcanic rock. Strongly kaolinized material in vein and wall rock.	Developed by 2 east-driven adits at about a 100-foot vertical interval.

GRAPHITE

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	New Deal prospect			Graphitic schist.	See under gold.
	Smuggler prospect	Undetermined	Undetermined, 1958; G. F. Franklin, Porterville (1918)	Undetermined	Unconfirmed occurrence last reported in 1918 (Boalich, Castello 18b:16t).

Graphite

Although graphite has been reported at several localities in Kern County, none had been mined by 1959 because the amount was small. At a locality in the Loraine district, 11 miles east of Loraine, irregular masses of graphite are in a 5- to 10-foot-wide zone in mica schist. An unconfirmed deposit of graphite was reported near Fort Tejon (Browne, 1869, p. 254). Boalich and Castello (1918, p. 16) list the Smugglers graphite mine in Kern County, but do not name the location of it. Graphite commonly is found as widely disseminated flakes and grains in coarsely crystalline carbonate rocks in the Sierra Nevada and Tehachapi Mountains.

Gypsum

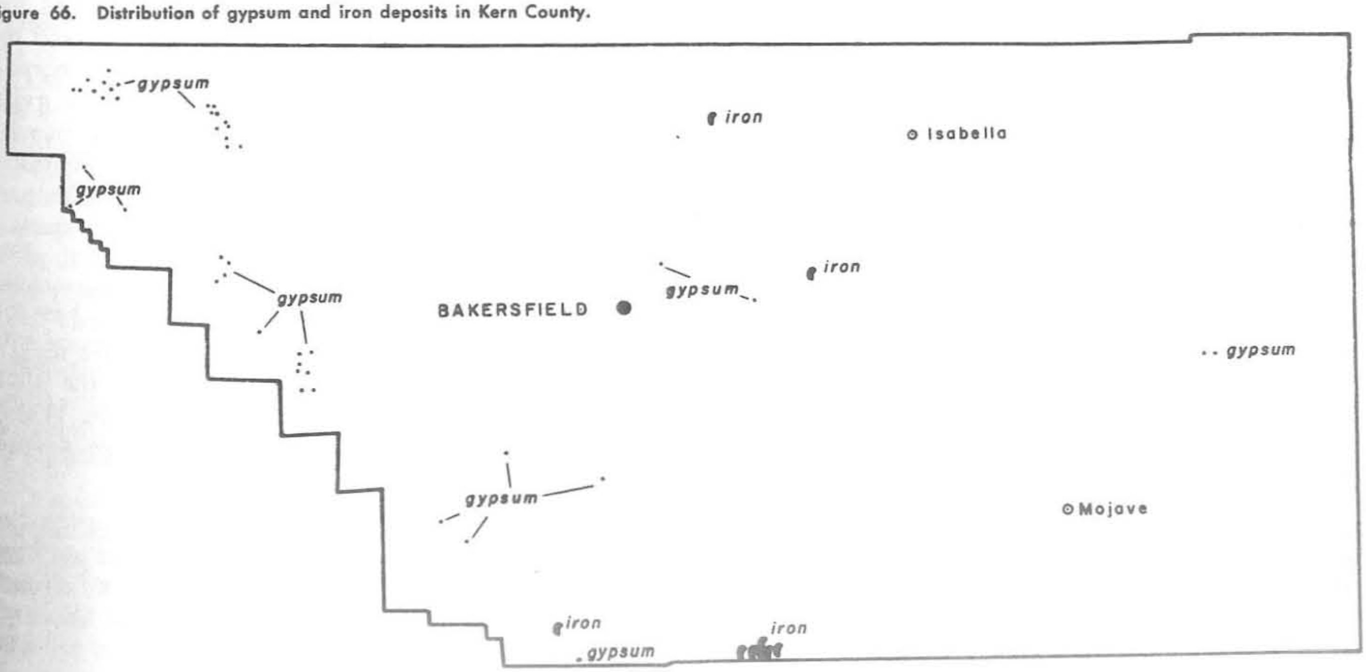
By William E. Ver Planck

Several hundred thousand tons of gypsum are used each year in the San Joaquin Valley for conditioning alkali soils, and much of it is obtained from deposits in Kern (fig. 66) and neighboring counties that are within 150 miles of the farms. Gypsum for agricultural purposes need not be of high grade because most of the impurities likely to be present act as harmless diluents.

Producers of agricultural gypsum must comply with the provisions of the Agricultural Code of California, which requires, among other things, that the producer be registered with the State Bureau of Chemistry. Although the law does not specify the minimum gypsum content of agricultural gypsum, the Bureau of Chemistry makes frequent inspections to determine if the material offered for sale conforms with the registrant's own guarantee. The names of registrants together with the partial analyses of samples are published in Fertilizing Materials, a pamphlet that is issued yearly by the Bureau of Chemistry. The list of registrants includes not only producers but also dealers and importers. Registrants that the writer believes have mined gypsum at some time during the period 1946-58 are included in the tabulation of gypsum deposits accompanying this report.

By far the largest part of the gypsum mined in Kern County is gypsite, which is an earthy form of gypsum consisting of gypsum crystals mixed with silt or clay; but since 1955 rock gypsum also has been mined. In 1958, most of the material mined in Kern County contained 60 to 70 percent gypsum. Small tonnages of gypsite were

Figure 66. Distribution of gypsum and iron deposits in Kern County.



mined in Kern County as early as 1890, but the output did not approach 100,000 tons a year until 1940.

Most of the known gypsite deposits in the county are in the San Joaquin Valley area, especially in the Lost Hills, the foothills of the Temblor Range near Belridge, the Telephone Hills near McKittrick, and old Kern Lake near Connor. Koehn Lake, 20 miles northeast of Mojave in the Mojave Desert, also has deposits. Gypsite forms in regions of little rain and fast evaporation. Small gypsum crystals form at or near the surface to which calcium sulfate-bearing ground water is drawn by capillary action. Two types of gypsite deposits have been recognized; those that form caps on the outcrops of upturned gypsiferous beds, and those in alluvium.

Deposits that have formed on gypsiferous outcrops are probably more numerous but smaller than the other type. Many of the Tertiary formations around the periphery of the San Joaquin Valley contain gypsum in the form of crystals and fragments of selenite, as veinlets of satin spar, as part of the cement of sandstone, or as thin layers of gypsum interbedded with shale. The overlying gypsite bodies, which generally grade downward into the source material, closely parallel the present surface. Many individual bodies crop out over several acres and attain maximum thicknesses of 3 or 4 feet. Deposits of this type are in the Temblor foothills, in the Telephone Hills, in the Sunset oil district southeast of Maricopa, and on Round Mountain northeast of Bakersfield.

Some of the gypsite deposits found in alluvium are efflorescent accumulation derived from ground water, but flowing surface waters may have been a factor in the formation of others. The deposits at old Kern Lake and Koehn Lake are irregular lenses that lie in sharp contact with lake-type beds, and they are thought to have formed on moist ground along the lake margins (Hess, 1920, p. 71-73). In the Telephone Hills, two of the deposits, which are buried in the beds of dry washes, may have formed from an accumulation of gypsum-bearing ground water; or the gypsite may have been washed down slope from other deposits on the surrounding hillsides. The deposits in the Lost Hills are flat-lying lenses similar in some respects to those at Kern Lake and Koehn Lake, but a considerable body of evidence suggests that most of the gypsite was transported in granular form to the area by water and laid down as a sedimentary deposit.

Two deposits of rock gypsum are known in Kern County, one near Bitterwater Creek in the northwest corner of the county, the other in Cuddy Canyon west of Lebec. In both places gypsum forms lenticular beds associated with Tertiary nonmarine sediments in or near the San Andreas fault zone. The one near Bitterwater Creek is associated with the Plio-Pleistocene Paso Robles formation; that in Cuddy Canyon is probably Miocene in age.

Although the total production of gypsite in Kern County is great, many individual deposits are small and have been exhausted after a year or two of intensive mining. Seldom have more than half a dozen operators been active at one time, yet the records contain the names of more than 50 producers. Most of them have been small unincorporated enterprises; many have failed because of inadequate financing or inability to produce gypsite of the quality guaranteed; others have gone out of business after exhausting their deposits; and only a few have been able to systematically develop reserves to replace deposits that they have mined out. The principal producer is H. M. Holloway Incorporated, which has been continually active in the Lost Hills since 1934.

Because the gypsite deposits in Kern County are unconsolidated and lie close to the surface, they can be mined comparatively cheaply with earth-moving equipment. Most of the operators use small- to medium-sized carryall scrapers to excavate the gypsite and place it either in stock piles or trucks. Ordinarily, the gypsite is picked up by scrapers without difficulty; but a few deposits are so hard that two tractors are required for each scraper. Much gypsite is sent directly to the farms without processing; but commonly it is screened if it contains roots or stones. A few operators have installed hammer mills to crush lumpy gypsite, Comparatively little work is required to prepare the deposits for mining. Overburden in maximum ratio of 1 to 1 is removed with bulldozers or scrapers. If much grass is present, plowing may be necessary first. Access roads must be built and truck-loading chutes prepared. The larger operators have field offices where outgoing trucks are weighed and billed. Some have facilities for wetting down the loaded trucks to prevent loss of the fine, powdery gypsite on the public highways.

Belridge Area

The gypsite deposits mined in the foothills of the Temblor Range, west of the Belridge oil fields, are reached from State Highway 33 via 7th Standard Road or Lokern Road. Gypsite workings are largest and most numerous near Gould Hill, but they extend north to Carneros Canyon and south to Salt Creek. The gypsite has developed on the outcrops of gypsiferous members of the Miocene Maricopa shale and the Plio-Pleistocene McKittrick formation, which, in general, strike parallel to the trend of the Temblor Range and dip eastward toward the San Joaquin Valley (English, 1921, pl. 1). In March 1958, the Temblor Gypsum Company, which commenced operations in 1956, was the only active producer in the Belridge area. Others that have reported production from the Belridge area include the Valley Agricultural Gypsum Company (1939-43); the Western Gypsum Company (1950-53); and Belridge Gypsum Mines (1956-57).

Temblor Gypsum Company Deposits. Location: Secs. 1, 11, 14, T. 29 S., R. 21 E., M.D.M., 12 miles northwest of McKittrick. Ownership: Temblor Gypsum Company, Carrisa Plains Star Route, Box 80, Santa Margarita (1958).

Early in 1958, the Temblor Gypsum Company was preparing to ship gypsite from a deposit on the north slope of Gould Hill. The deposit is about 300 yards in diameter, and has an average thickness of 4 feet. An access road had been built, a truck-loading chute was under construction near the downslope margin of the deposit, and the stripping of a few inches of grass and soil had been completed. Because the gypsite is moderately hard, the carryall scraper used for mining was excavating only a few inches at each pass. The scraper was covering the whole deposit with circular traverses, gradually lowering the whole surface. Bedrock had not been reached. The gypsite was being stored in a stockpile from which a bulldozer, by means of a loading chute, could transfer it to trucks. The product is agricultural gypsum guaranteed to contain 65 percent $CaSO_4.2H_2O$.

The Temblor Gypsum Company has worked other gypsite deposits in the Belridge area. One, practically exhausted before 1958, is in sec. 11, T. 29 S., R. 20 E., M.D.M., on the south-facing slope of a creek that enters the head of Temblor Valley. Gypsite that may originally have been as much as 3 feet thick was mined from an area of 75 to 100 acres. Some low-grade, stony gypsite at the base of the deposit remains. The underlying rock on which the gypsite formed is gypsiferous shale and sandstone with small and sparsely distributed lenses of limestone. Locally, at least, the bedrock strikes N. 80° W. and dips steeply northeast. The gypsite forms east-trending bands, several hundred yards long and as much as 100 yards wide, that are separated by bands in which no gypsite is found. Thus it seems likely that the gypsite formed only on the outcrops of certain favorable beds. Gypsite also has been mined from a north-facing slope in Sec. 14, T. 29 S., R. 20 E., M.D.M., half a mile south of the deposit in section 11.

Other Workings. Gypsite has been obtained from an area of several hundred acres in sec. 1, T. 29 S., R. 20 E., M.D.M., between Gould Hill and Chico Martinez Creek. The deposits are on two parallel, northeast-facing slopes, the first bordering the San Joaquin Valley, the second, one-quarter of a mile to the southwest. Shale-pebble conglomerate of the McKittrick formation (English, 1921, p. 28) crops out along the summit of the first ridge, but there are no other outcrops of bedrock at this locality. The gypsite, which has been almost entirely removed, is underlain by fine sand and gravel that contains sparsely distributed fragments of selenite gypsum.

Belridge Gypsum Mines, and probably others, have mined deposits in sec. 34, T. 28 S., R. 20 E., M.D.M., 3 miles northwest of Gould Hill. The gypsite is underlain by the McKittrick formation.

Bitterwater Creek Area

Location: Sec. 31, T. 27 S., R. 18 E., M.D.M., near Sumners, about 12 miles west-southwest of Blackwells Corner. The area can be reached via the Bitterwater Valley road from Blackwells Corner or the Shandon-Simmler road from Shandon, San Luis Obispo County. Ownership: Sumner-Wreden estate; leased to Superior Gypsum Company, Albert Chanley, 3916 Pierce Road, Bakersfield. The Superior Gypsum Company has been producing ground rock gypsum for agricultural use from the Bitterwater Creek deposits since July 1955.

Fine-grained brown rock gypsum, more than 90 percent pure, is associated with sedimentary rocks of the Plio-Pleistocene Paso Robles formation within or close to the San Andreas fault zone. Outcrops of rock gypsum lie in a zone at least a mile long that runs southeastward from the vicinity of Sumners. Probably the gypsum is in distinct, separate lenses as much as 100 feet in length and 10 to 25 feet thick, rather than in a single continuous bed. The gysiferous zone is in clay shale that weathers readily and does not form outcrops. Beds of coarse sand and gravel are exposed in the bed of Bitterwater Creek, 100 yards from the nearest gypsum outcrop.

The principal mining and milling operations are one-quarter of a mile southwest of Sumners on the crest and northeast-facing slope of the ridge bordering Bitterwater Creek where a pit 200 feet long, 100 feet wide, and 50 feet deep near the crest of the ridge has yielded several tens of thousands of tons of gypsum. In March 1958, this pit was idle because the gypsum that remained in it lay beneath an excessive amount of overburden; and the company was working a second pit on the hillside 200 yards to the northeast. Where the gypsum is comparatively thin, it can be broken with a bulldozer so that a power shovel can load the gypsum chunks mixed with weathered shale into trucks. When clean gypsum is required, the overburden is stripped from the thicker parts of the lens and the gypsum is broken by drilling and blasting. The crude gypsum thus obtained is ground to 20 mesh in a mill equipped with a jaw crusher and hammer mill in circuit with screens. Electric power to drive the machinery is generated at the mill. The company makes two products, both of which are shipped by truck in bulk for agricultural use. One is guaranteed to contain 90 percent gypsum; the other, obtained by processing a mixture of gypsum and weathered shale, contains at least 70 percent gypsum.

Cottonwood Creek (Cottonwood Co., W. A. Fauntleroy, Gypsum Mining Co., Pampa Gypsum Mining Co.) Deposits. Location: secs. 20, 21, 27, 28, 29, 33, 34, T. 29 S., R. 30 E., M.D.M., near Cottonwood Creek, 16 miles east of Bakersfield on the west flank of the Sierra Nevada. Owner: Oscar Rudnick, Trustee, and P. Sumner Brown, Bakersfield (1949). The deposits can be reached via unimproved roads from Bena on U. S. Highway 466 or from Breckenridge Road.

The Cottonwood Creek deposits were among the first to be worked for gypsite in California. About 1890, Captain W. A. Fauntleroy formed three companies, the Cottonwood Company, the Gypsum Mining Company, and the Pampa Gypsum Mining Company, to mine gypsite for agricultural use from deposits along Cottonwood Creek 3½ miles above Breckenridge Road (Angel, 1890,

pp. 223, 224). About 1907, William Harmon was prospecting other deposits on the north side of the divide between Cottonwood Creek and Caliente Creek; and the Fauntleroy operations had been idle for some time (Hess, 1920, pp. 70, 71). Gypsite also has been mined south of the divide, but the writer has not ascertained when or by whom the work was done.

The gypsite deposits are underlain by the Oligocene Walker formation (Dibblee and Chesterman, 1953, pl. 1). Gypsite perhaps originally as much as 5 feet in thickness has been largely removed from an area of 25 to 50 acres in secs. 33 and 34, T. 29 S., R. 30 E., M.D.M., on both sides of a creek that flows south toward Bena. Thin-bedded gray sandstone cut by veinlets of satin spar gypsum underlies the deposits. Test pits and trenches show that gypsite is not present on the crest of the ridge to the east, and that only small bodies less than 2 feet thick are present on the upper slopes above the old workings.

The deposits worked by Fauntleroy are in secs. 20 and 21, T. 29 S., R. 30 E., M.D.M., on both banks of Cottonwood Creek and 50 to 75 feet above the creek bed. Originally, several acres were covered with gypsite 2 to 3 feet thick that grades downward into soft, earthy material (Angel, 1890, p. 223).

The deposits prospected by Harmon are in sec. 28, T. 29 S., R. 30 E., M.D.M., on hilltops and in intervening gulches south of Cottonwood Creek. The hilltop deposits are comparatively small, but a specimen from one of them was found to contain 74.8 percent gypsum (Hess, 1920, p. 71). The gulch deposits, which Hess believes to be accumulations of gypsite washed in from above, are several hundred feet long and as much as 25 feet thick.

Kern Lake (Crystal Gypsum Co., Pacific Gypsum Co.) Deposits. Location: secs. 26, 27, 34, T. 32 S., R. 27 E., M.D.M., on the south margin of older Kern Lake, 14 miles south-southwest of Bakersfield. Owner: Kern County Land Company. The deposits can be reached from U. S. Highway 99 via Copus Road.

The gypsite deposits near Kern Lake, which has been drained, were discovered in an irrigation ditch that was excavated at some time before Hess visited them during the winter of 1906-07 (Hess, 1920, p. 71-73). They remained idle until 1946 when the Kern County Gypsite Company prepared to mine the gypsite for agricultural use. The Pacific Gypsum Company then took over the operation and mined gypsite at a substantial rate until the deposits were exhausted, about 1951. The Crystal Gypsum Company mined a smaller tonnage from nearby deposits during 1947 and 1948. The Kern Lake deposits probably have yielded about 100,000 tons of material containing 60 to 70 percent gypsum.

Gypsite is present near the former shore line of Kern Lake, but none has been found in the central part of the lake bed. Within 2 feet of the surface numerous lenticular bodies 1 to 3 feet thick (fig. 67), lie with a sharp but irregular contact on brown clay. Most of the gypsite is light colored, earthy, and comparatively pure; but near the bases and lateral limits of individual bodies, it is hard, gray, and comparatively impure. The gypsite contains solution cavities as much as 3 feet in diameter.

Figure 67. View of pale gypsite and gypsiferous clay beds overlain by darker soil, Kern Lake gypsite deposit.

Koehn Lake Area

The gypsite deposits of Koehn Lake, about 25 miles northeast of Mojave, have been worked intermittently, but on a relatively small scale since their discovery in 1909. They have been described by Hess (1910b). The output, which probably totals 50,000 to 75,000 tons, has been used mostly for agricultural purposes.

Koehn Lake is a playa in Cantil Valley, an undrained basin between El Paso Mountains and the Rand Mountains. Ordinarily the lake surface is dry, but after heavy rains a few inches of water accumulate in the central part and form brine from which salt is obtained (see under *Salt* in this report). The gypsite is on the south side of the playa, well above the area of flooding. Most of the gypsite produced has come from the Daly deposit in sec. 28, T. 30 S., R. 38 E., M.D.M., but the adjoining Halsey deposit in section 29 also has been worked. These deposits can be reached from U. S. Highway 6 via graded roads from Cantil.

Gypsite, with no overburden except for grass, covers most of section 28 and the eastern part of section 29. Although selected specimens contain more than 80 percent gypsum, most of the gypsite output in recent years had a guaranteed gypsum content of 60 percent. An average of 5 feet of relatively pure gypsite grades into gray gypsite of lower quality about a foot thick at the base.

The gray gypsite in turn rests with a sharp contact on clay. Boreholes penetrated clay layers containing sparsely distributed selenite crystals. Some relatively small areas in the deposit are rendered soft by seepages of rising water, and it seems likely that the seepages have played a part in the formation of the gypsite.

Daly (Cane Springs, Cave Springs, Koehn Lake, Mojave Desert) Deposit. Location: Sec. 28, T. 30 S., R. 38 E., M.D.M., on the south side of Koehn Lake, 3½ miles east-southeast of Cantil. Ownership: C. A. Koehn, 1909-30; Jennie E. Koehn (Mrs. C. A. Koehn), 1930-32; Jennie E. Daly, 1932-46; A. D. Daly, 1946-January 1958; Estate of A. D. Daly. Leased to Mojave Desert Gypsite Co., P.O. Box 467, Lindsay (1958).

Lessees have produced most of the gypsite obtained from the Daly deposit. In 1910, shortly after the discovery of the deposit, a small calcining plant was built to manufacture wall plaster from gypsite of 80 to 85 percent gypsum content. The Crown Plaster Company reported a small production in 1912 and the first part of 1913, but the enterprise failed after an unsuccessful reorganization as the California Gypsum Hollow Tile Company.

A more successful operation was carried on from about 1926 to 1935 by George W. Abel, who sold a product known as Mojave Desert Agricultural Gypsum with a guaranteed gypsum content of 80 percent. Abel furnished a substantial part of agricultural gypsum used in California, which at that time amounted to about 10,000 tons a year. In Abel's operation, the covering of grass was first plowed up and removed. Then scrapers moved the uncovered gypsite into loading pockets from which it was hauled in small rail cars drawn by a Plymouth locomotive to a mill at Gypsite on the railroad. There part of it was ground and sacked, and part of it was bulk loaded into gondola cars for shipment to the San Joaquin Valley.

Perhaps because of the rising output from mines in the San Joaquin Valley, especially in the Lost Hills area, the Daly deposit yielded comparatively little gypsite from 1935 to 1950. In 1951 J. R. Canady of Lancaster installed new equipment and began to work the deposit on a large scale. Bulldozers and carryall scrapers were employed to produce material guaranteed to contain 60 percent gypsum. All material shipped was screened to remove lumps larger than ½-inch in diameter, unless it was known that the gypsite was to be applied to land that was being cultivated for the first time. In addition, some minus 1/16-inch gypsite was sold for application by spraying with irrigation water. Canady's lease was terminated in 1954, and in 1958 the deposit was being operated by Mojave Desert Gypsite Company, formerly Cal-Desert Gypsite Company.

Additional operators, some of whom produced little if any gypsite, have leased the deposit. They include the Alpine Lime and Plaster Company, 1922; Walter Calaway, 1936-45; the Pacific Gypsum Corporation, 1946 and 1947; Wayne Doughty; 1950; and the Mountain States Uranium Corporation, Agricultural Gypsite Division, 1954.

Halsey Deposit. Location: E½ sec. 29, T. 30 S., R. 38 E., M.D.M., on the south side of Koehn Lake, 2½ miles east southeast of Cantil. Owner: Mrs. M. E. Brehme, Hollister (1956); leased to Antelope Valley Agricultural Gypsite Company, D. F. Halsey, Rosamond, 1953-56.

The Halsey deposit adjoins the west side of the Daly deposit. Production began in 1953, and comparatively small shipments of agricultural gypsum were made until the death of Halsey in July 1956. The deposit consists of grass-covered gypsite as much as 2 feet thick that rests with a sharp contact on clay. In mining, the ground was first loosened with a disk harrow then excavated with a smaller scraper. The gypsite was raised with a bucket elevator to a double-decked vibrating screen in which roots and lumps were removed. The fines, guaranteed to contain 60 percent gypsum, were stockpiled or loaded directly into trucks for shipment to farms in the San Joaquin Valley as well as in Antelope Valley.

Lost Hills Area

The largest known gypsite deposits in California are on the west flank of the Lost Hills. They are readily accessible from U. S. Highway 466 via Brown Materials Road. Probably 2 million tons of gypsite, most of it containing 60 to 70 percent gypsum, has been produced since mining operations began there about 1930. The principal producer is H. M. Holloway, Incorporated, whose yearly output is exceeded in California only by that of the Fish Creek Mountains operation of the United States Gypsum Company. In 1958, C. L. Fannin was the only other producer in the Lost Hills; but production also was reported from the Handel deposit, (1941-44); by Roberts Farms Gypsum Mines (1952 and 1953); by the Star Gypsum Company (1933 and 1934); and by the Theta Gypsum Company, C. F. Casida (1941-43).

Gypsite bodies in silty sand are scattered along the west side of the Lost Hills for a distance of 5 miles. Most of the bodies rest on clay but some rest on gypsum-bearing gravel that is underlain by clay. Some of the largest individual bodies are elongate and are in and along the washes that cut through the hills; others are pancake-shaped lenses as much as 20 feet thick. Typically the gypsite is within 3 feet of the surface, but in a few places it lies beneath as much as 10 feet of overburden. Information gained from mining and exploratory drilling reveals that the deposits are composite bodies composed of several gypsite lenses. They contain scattered pebbles and lenticular masses of sand and gravel.

H. M. Holloway, Incorporated, believes that most of the gypsite was laid down by water as a sedimentary deposit. At some period less arid than the present, occasional floods of storm water may have come from the Temblor Range and have been temporarily ponded against the Lost Hills, which acted as a barrier. This flood water may have carried with it gypsite from the deposits in the Temblor foothills. Probably most of the floods reached no farther than the Lost Hills, where they

deposited their loads of gypsite, more or less separated from non-gypsiferous material by hydraulic classification. At times, the water seems to have broken through the Lost Hills, scouring channels through the deposits already formed, and distributing gypsite along the washes. Scoured channels were subsequently filled with gypsite or other material.

Fannin Deposit. Location: Secs. 3, 4, 10, 11, T. 26 S., R. 20 E., M.D.M., in the Lost Hills, approximately 26 miles west of Wasco. Ownership: Several parcels of multiple ownership fee land; leased to C. L. Fannin, Route 1, Box 7, Wasco.

At least since the mid-1940s C. L. Fannin has produced gypsite for agricultural use from deposits in Kern County as well as San Luis Obispo County. Recently, operations have been confined to the Lost Hills, and the pit worked early in 1955 was in S½NW¼ sec. 11, T. 26 S., R. 20 E., M.D.M., on land leased from the Williamson Estate, Incorporated. The deposit, which lies just east of the crest of the Lost Hills, consists of an average of 20 inches of gypsite lying on clay. The clay is stained with streaks of red hematite and contains sparsely distributed crystals of selenite gypsum. Two carryall scrapers were used for stripping and mining. In March 1958, the deposit in section 11 was idle, and gypsite was being taken from pits in secs. 3 and 4, T. 26 S., R. 20 E., M.D.M., on the west side of Brown Materials Road.

Holloway (H. M. Holloway, Incorporated, Lost Hills) Deposit. Location: secs. 3, 10, 11, 14, 15, 23, 24, 25, 26, T. 26 S., R. 20 E., M.D.M., and sec. 30, T. 26 S., R. 21 E., M.D.M., in the Lost Hills approximately 26 miles west of Wasco. Ownership: H. M. Holloway, Incorporated, 714 6th Street, Wasco, leases fee land and holds mining claims on Federal petroleum land under Public Law 585.

H. M. Holloway, Incorporated, the principal producer of gypsite in California, has been in operation since 1934. Since 1955 the gypsite has come from deposits along the entire gypsite-bearing length of the Lost Hills, but before October 1955 the company also worked deposits near Avenal Gap, Kings County.

The gypsite deposits in the Lost Hills area are on petroleum land that is partly owned in fee by oil companies and others and is partly Federal petroleum land that is leased to oil producers. H. M. Holloway Incorporated pays royalties to the owners of fee lands. The royalties vary widely depending on the estimated cost of mining, the cost of access roads and other development work, and the extent of restoration of the surface after mining that may be stipulated. Some payments are higher than 25 cents per ton; others are lower. Since 1954 title to the deposits on Federal petroleum land can be held with mining claims under Public Law 585, the Multiple Mineral Development law.

Individual gypsite bodies are comparatively small, but the total tonnage mined has been large. In order to develop the reserves necessary to maintain production at a consistently high rate, the company conducts a systematic program of exploratory drilling and sampling. In 1948, mining was proceeding in SE¼ sec. 24, T. 26 S., R. 20 E., M.D.M., near the field office. By September 1949, the pits in section 24 had been closed, and most of the output was coming from S½ sec. 3, T. 26 S., R. 20 E., M.D.M., about 4 miles to the north. In January 1955, operations had been shifted again to another part of section 24 and to NW¼ sec. 30, T. 26 S., R. 21 E., M.D.M., south of the field office, while a deposit in sec. 14, T. 26 S., R. 20 E., M.D.M. was being prepared for production. Early in 1958, deposits in sec. 25, T. 26 S., R. 20 E., and sec. 30, T. 26 E., R. 21 E., M.D.M. yielded most of the output.

Carryall scrapers are used for stripping and mining. Most of the output is pit-run material bulk loaded into trucks that, after being weighed and billed, haul it directly to the farms. Two grades are shipped, one guaranteed to contain 70 percent gypsum; the other, 60 percent. Some of the gypsite is ground and shipped in bulk for use in gypsum water applicators. In 1955, the 60 percent material sold for $1.50 per ton at the mine, the 70 percent material for $1.75 per ton, and ground material for $4.00 per ton.

Round Mountain Area

Location: sec. 24, T. 28 S., R. 28 E., M.D.M., near Round Mountain, 8½ miles northeast of Bakersfield. Owner: Not ascertained; leased to Purity Gypsum Mines, C. F. Casida, 715 34th Street, Bakersfield, 1953 and 1954.

During 1953 and 1954, Purity Gypsum Mines obtained comparatively low-grade gypsite of 40 to 50 percent gypsum content from a number of small deposits within an area of several hundred acres near Round Mountain. In February 1955, the deposits were idle, and the equipment used for mining had been removed. Practically all of the gypsite, except for thin remnants that contain stones, has been mined off. The gypsite is underlain by fine sand containing abundant fragments of selenite and satin spar gypsum. Bedrock in the vicinity of the gypsite deposits is the Round Mountain silt member of the Miocene Temblor formation (Birch, fig. 1, in Keen, 1943), which, in a few exposures is seen to contain as much as 15 percent of satin spar veinlets.

Sunset Oil District

Location: secs. 27 and 28, T. 11 N., R. 23 W., S.B.M., 4½ miles southeast of Maricopa. The area is accessible from Maricopa via Western Minerals Road. Ownership: Federal petroleum land; held by Kern Gypsum Mines, C. F. Casida and Claud Stanphill, Bakersfield, with placer claims located in 1954 under Public Law 585, the Multiple Mineral Development law.

The comparatively small but widespread gypsite deposits of the Sunset oil district were mapped and described many years ago by Watts (1894, p. 35-36), but have been worked to only a limited extent. Some gypsite was produced in 1952 by the Foster Trucking Company. In February 1955, Kern Gypsum Mines had equipment

on the property, but was not mining gypsite. The deposits have been idle since Casida and Stanphill, owners of Kern Gypsum Mines, transferred their gypsite operations to the Belridge area in 1956.

Gypsite is discontinuously exposed for about a mile, between Bitter Creek and Santiago Creek, along the top and flanks of an outlying ridge which is part of the San Emigdio Mountains and faces the San Joaquin Valley. The gypsite forms numerous irregular, surficial bodies without overburden except about 1 foot of material that contains roots and decayed vegetation. Individual bodies are as much as 3 acres in areal extent and 2 feet in thickness. Most of the gypsite, however, is comparatively hard; and parts of some bodies are contaminated with sand. Sulfur deposits are associate with the gypsite in the west-central part of the area (see under Sulfur in this report). The bedrock on which the gypsite has developed is brown sandstone of the lower Miocene Vaqueros formation (Pack, 1920, p. 34), which locally contains veinlets of satin spar gypsum. In the western part of the property gypsite has accumulated in a gully to form a hard mass 100 feet wide and estimated by Kern Gypsum Mines personnel to be 90 feet thick. Grinding would be required to prepare this unusually hard gypsite for agricultural use.

The gypsite deposits have been well explored by trenching, and some have been stripped of overburden. Some tunnels have been driven in bedrock below the gypsite deposits, but their purpose and date of excavation were not ascertained.

Telephone Hills (Abbott and Hickox, Ebbott and Hickox, Monolith Portland Cement Co.) Deposits. Location: secs. 29, 30, 31, 32, T. 30 S., R. 22 E., secs. 5 and 8, T. 31 S., R. 22 E., M.D.M., 1 to 4 miles south of McKittrick. Ownership: many parcels of multiple-ownership fee land.

The Telephone Hills deposits were worked intermittently for many years, but have been idle since about 1950. The total output, amounting to between 150,000 and 200,000 tons, has been used mostly in agriculture; the rest, as a retarder in the manufacture of portland cement. Milton McWhorter recalls that the Eureka Gypsum Company, with which he was associated, produced agricultural gypsum at McKittrick and elsewhere in the San Joaquin Valley about 1895 (Latta, 1949, p. 146). Whether or not their operations included one in the Telephone Hills was not ascertained by the writer, but Abbott and Hickox was in production there in NE¼SW¼ sec. 30, T. 30 S., R. 22 E., M.D.M. when Hess studied the area in 1907 (Hess, 1920, p. 68, 69). Abbott and Hickox, after reorganization as the McKittrick Gypsum Company, was active until about 1915. The tabulation of gypsum deposits below lists additional companies that may have mined gypsite in the Telephone Hills about the same time or a little later, but their workings have not been identified.

At least some of the gypsite mined before World War I was high-grade material containing more than 90 percent gypsum (Hess, 1920, p. 68). Perhaps because of the exhaustion of easily obtainable, high-grade gypsite, the deposits were idle until 1940 and 1941 when the Monolith Portland Cement Company mined gypsite in secs. 31 and 32, T. 30 S., R. 22 E., and sec. 5, T. 31 S., R. 22 E., M.D.M. The company used the gypsite in the manufacture of portland cement in their plant at Tehachapi. Between 1941 and 1950 four companies produced gypsite for agricultural use; they were Green and Collins, the Gypsum Company of California, The McKittrick Agricultural Gypsum Company, and the Western Gypsum Company. Much of the area is so covered with pits, prospect trenches, and waste piles that their workings cannot be distinguished from those made earlier.

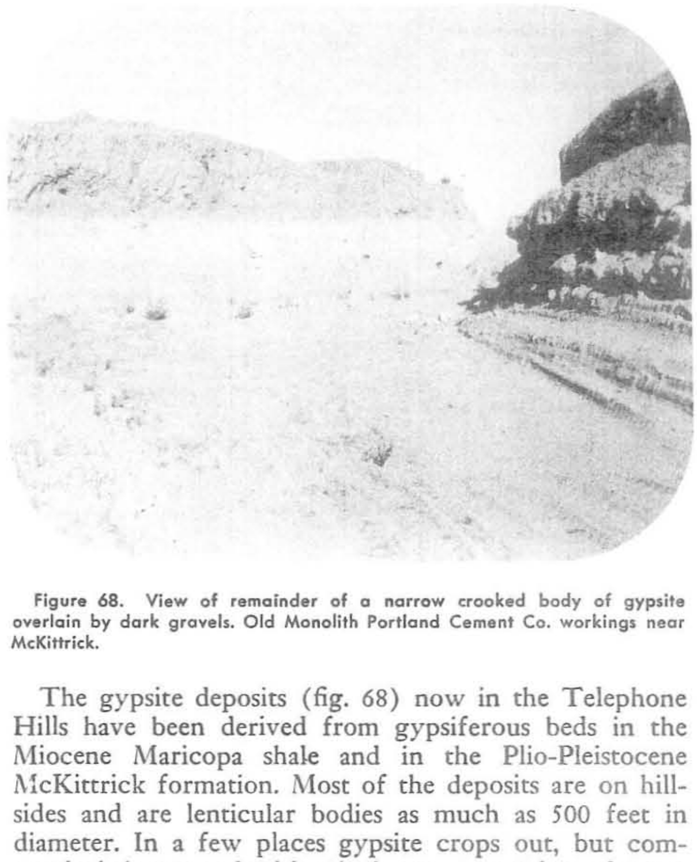


Figure 68. View of remainder of a narrow crooked body of gypsite overlain by dark gravels. Old Monolith Portland Cement Co. workings near McKittrick.

The gypsite deposits (fig. 68) now in the Telephone Hills have been derived from gypsiferous beds in the Miocene Maricopa shale and in the Plio-Pleistocene McKittrick formation. Most of the deposits are on hillsides and are lenticular bodies as much as 500 feet in diameter. In a few places gypsite crops out, but commonly it is covered with 6 inches to 4 or 5 feet of stony soil. Commonly the deposits grade downward into gypsiferous silt with shale pebbles, or into sandy gravel that contains fragments of selenite gypsum. Where gypsite is absent, outcrops of non-gypsiferous, siliceous shale or shale-pebble conglomerate are common. Some of the gypsite forms crooked bodies, as much as 10 feet thick, 10 to 20 feet wide, and as much as several thousand feet long, that are buried in the alluvial material of dry washes. The gypsite grades laterally into gypsiferous gray clay and lies on gravel that contains fragments of selenite gypsum.

GYPSUM

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Abbott & Hickox				See Telephone Hills in text. (Brown 16:515; Hess 10b:17; 20:68; Ver Planck 52:55).
	Alpine Lime & Plaster Co.				See Daly in text. (Ver Planck 52:131t).
	Antelope Valley Agricultural Gypsite Co.		Antelope Valley Agricultural Gypsite Co., D. F. Halsey, P.O. Box 535, Rosamond (1956)		See Halsey in text. Held license to produce gypsum, 60 percent grade, for agricultural use, 1953-1956. Gypsite from Halsey deposit. (California Bur. Chemistry 53-56).
	Lyman Appel		Lyman Appel, 500 Auburn, Tulare (1956)		Held license to produce gypsum, 50 percent and 60 percent grade, for agricultural use, 1955 and 1956. Developed deposits near Devils Den, possibly in Kings County. Did not achieve commercial production. (California Bur. Chemistry 55; 56).
	Atlas No. 1 prospect	NW¼ sec. 11, T29S, R37E, MDM, 6 miles north of Redrock	Undetermined, 1958; Albert E. Droubie, Los Angeles (1952)	Slightly gypsiferous sandy soil overlying Quaternary-Tertiary sediments.	An undeveloped prospect. No production. (Dibblee, Gay 52:49, 62t).
384	Belridge Gypsum Mines	Sec. 36, T28S, R20E, MDM, 3 miles northwest of Gould Hill in Belridge area, 14 miles northwest of McKittrick	Undetermined, 1957; leased to Belridge Gypsum Mines, C. F. Casida and Claud Stanphill, 2108 So. M St., Bakersfield (1955); Belridge Gypsum Mines, Mel Northington, 1122 Castaic Ave., Bakersfield (1957)	Gypsite developed on hill slopes underlain by McKittrick formation.	Formerly Kern Gypsum Mines. Held license to produce gypsum, 60 percent, 65 percent and 70 percent grade, for agricultural use, 1955-1957. (California Bur. Chemistry 55; 56).
	Bitter Creek				See Sunset oil district in text. (Calif. Div. Mines, Mineral Information Service, 56:3).
385	Bitterwater Creek (Superior Gypsum Co.)	Sec. 31, T27S, R18E, MDM, near Sumners, 12 miles west-southwest of Blackwells Corner	Sumner-Wreden estate. Leased to Superior Gypsum Co., Albert Chanley, 3916 Pierce Road, Bakersfield (1958)		See text.
386	Buena Vista Lake	Sec. 13, T32S, R25E, MDM, on southeast shore of Buena Vista Lake, 12 miles east of Taft	Undetermined, 1958	Gypsite on lake beds near shore of Buena Vista Lake.	Undeveloped deposit exposed in railroad cut. (Hess 10b:25; 20:73; Ver Planck 52:123t).
	Cal-Desert Gypsite Co.		Cal-Desert Gypsite Co., P.O. Box 1544, McFarland (1955)		See Daly in text. Held license to produce gypsum, 60 percent grade for agricultural use, 1954 and 1955. Gypsite from Daly deposit. Became Mojave Desert Gypsum Co. (California Bur. Chemistry 54; 55).
	California Gypsum Hollow Tile Co.				See Daly in text. (Ver Planck 52:133t).
	California Gypsum & Mineral Co.				See McKittrick - I. (Aubury 06:284; Brown 16:515; Hess 10b:16; 20:67; Tucker 19:917).
	J. R. Canady		J. R. Canady, Route 2, Box 303, Lancaster (1954)		See Daly in text. Held license to produce gypsum, 60 percent grade for agricultural use 1951-1954. Gypsite from Daly deposit. (California Bur. Chemistry 51-54).
	Cane Springs				See Daly in text. (Hess 10c; 20:73).
	Cave Springs				See Daly in text. (Tucker 21:311).
	Carriso				See Packwood Creek. (Name used by operator and on map of Kern County Board of Trade).
	Coloma Gypsum Mines	Approx. T28S, R20E, MDM, in Belridge area, 15 miles northwest of McKittrick	Undetermined, 1957; leased to Coloma Gypsum Mines, Don M. Crist, Mgr., Lebec, 1944-1946	Gypsite	Held license to produce gypsum for agricultural use, 1946. No record of production. Deposit held earlier by Valley Agricultural Gypsum Co. (California Bur. Chemistry 46; Ver Planck 52:134t).
	Cottonwood Co.				See Cottonwood Creek. (Angel 90:223; Ver Planck 52:136t).

GYPSUM, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
387	Cottonwood Creek (Cottonwood Co., W. A. Fauntleroy, Gypsum Mining Co., Pampa Gypsum Mining Co.)	Secs. 20, 21, 27, 28, 29, 33, 34, T29S, R30E, MDM, near Cottonwood Creek, 16 miles east of Bakersfield	Undetermined, 1957; Oscar Rudnick, Trustee, and P. Sumner Brown, Bakersfield (1948) o		See text. (Angel 90:223; Aubury 06:284; Brown 16:515; Fairbanks 04:121; Hess 10b:19; 20:70; Tucker 21:311; 29:69; Tucker, Sampson, Oakeshott 49:247; Ver Planck 52:123t, 136t).
	Crown Plaster Co.				See Daly in text. (Ver Planck 52:71).
	Crystal Gypsum Co.		Crystal Gypsum Co., P.O. Box 823, Oildale (1948)		See Kern Lake. (Tucker, Sampson, Oakeshott 49:247; Ver Planck 52:51). Held license to produce gypsum, 60 percent grade, for agricultural use, 1947 and 1948. Gypsite from Kern Lake deposits. (California Bur. Chemistry 47; 48).
	Cuddy Canyon	Sec. 34, T9N., R21W, SBM, south side of Cuddy Cyn., 2 miles west of Frazier Park	Undetermined, 1958	Light brown gypsum in beds as much as 3 inches thick alternating with shale. Forms gypsum-bearing lenses as much as 15 feet thick with strike lengths of as much as 700 feet. Occur in Miocene (?) sedimentary and volcanic rocks on south side of San Andreas fault zone.	Developed by open cut and inclined shaft at undetermined date. See also under Borates. No record of production. (Gale 14b:455; Ver Planck 52:39).
388	Daly (Alpine Lime & Plaster Co., Cal-Desert Gypsite Co., California Gypsum Hollow Tile Co., J. R. Canady, Cane Springs, Cave Springs, Crown Plaster Co., A. D. Daly, Jennie Daly, Wayne Doughty, C. A. Koehn, Jennie E. Koehn, Koehn Lake, Mojave Desert, Mojave Desert Gypsite Co., Mountain States Uranium Corp.--Agricultural Gypsite Div., Pacific Gypsum Corp.)	Sec. 28, T30S, R38E, MDM, on the south side of Koehn Lake, 3½ miles east south-east of Cantil	Estate of A. D. Daly. Leased to Mojave Desert Gypsite Co., P.O. Box 467, Lindsay (1958)		See text. (Dibblee, Gay 52:49; Hess 10c;20:73; Tucker 21:311; 29:69; Tucker, Sampson, Oakeshott 49:248; Ver Planck 52:52).
	A. D. Daly				See Daly in text. (Dibblee, Gay 52:49; Ver Planck 52:135t). Held license to produce gypsum, 60 percent grade, for agricultural use, 1946-1949. (California Bur. Chemistry 46-49).
	Jennie E. Daly				See Daly in text. (Ver Planck 52:135t).

GYPSUM, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
389	Derby Acres	Sec. 4, 9, T31S, R22E, MDM, northwest of Derby Acres and 3½ miles southeast of McKittrick	Undetermined, 1957; Held by C. F. Casida, 715-34th St., Bakersfield, and Claud Stanphill, 2108 So. M. St., Bakersfield (1955)	Gypsite one to two feet thick developed on low, flat-topped hills underlain by Plio-Pleistocene McKittrick formation.	Deposit stripped and approx. 100 tons of gypsite stockpiled, 1954. No record of production.
	Wayne Doughty				See Daly in text. Held license to produce gypsum for agricultural use, 1950. (California Bur. Chemistry 50).
	Ebbott & Hickox deposit				See Telephone Hills. (Tucker 21:312).
390	Fannin deposit	Secs. 3, 4, 10, 11, T26S, R20E, MDM, in the Lost Hills, 26 miles west of Wasco	Fee land leased to C. L. Fannin, Route 1, Box 7, Wasco (1958)		See text.
	C. L. Fannin		C. L. Fannin, Route 1, Box 7, Wasco (1958)		Held license to produce gypsum, 60 percent grade, for agricultural use, 1948 to present (year ending June 30, 1958). Gypsite obtained from Packwood Creek deposits and Fannin deposits, Lost Hills. (California Bur. Chemistry 48-56).
	W. A. Fauntleroy deposit				See Cottonwood Creek in text. (Angel 90:223; Brown 16:515; Tucker 21:311; Ver Planck 52:136t).
	Foster Trucking Co.--Gypsum Dept.		Foster Trucking Co. - Gypsum Dept., 1700 Lotus Lane, Bakersfield (1952)		See Sunset oil district in text. Held license to produce gypsum, 60 percent and 70 percent grade, for agricultural use, 1952. Gypsite obtained from Sunset oil district deposits (California Bur. Chemistry 52).
	Green and Collins	SW part T30S, R22E, NW. part T31S, R22E, MDM, in Telephone Hills, 4 miles south of McKittrick	Undetermined, 1958; leased to Green and Collins, Ceres (1941)	Gypsite.	Production of gypsite for agricultural use reported 1941. (Ver Planck 52:56, 136t).
	Gypsum Co. of California	Telephone Hills, 2 miles south of McKittrick	Gypsum Co. of California, McKittrick (1947)	Gypsite.	Held license to produce gypsum, 70 percent grade, for agricultural use, 1946 and 1947. Gypsite from Telephone Hills. (California Bur. Chemistry 46; 47; Ver Planck 52:56).
	Gypsum Incorporated	Rosamond	Undetermined, 1958; Gypsum Incorporated, I. D. Watkins, Gen. Superintendent, P.O. Box 114, Rosamond (1947)		Plant for the production of agricultural gypsum, plaster, and wallboard. Under construction, 1946 and 1947. In the hands of Champco Minerals, 1948. (Tucker, Sampson, Oakeshott 49:248; Ver Planck 52:137t).
	Gypsum Mining Co.				See Cottonwood Creek in text. (Angel 90:223; Ver Planck 52:136t).
391	Halsey deposit	E½ sec. 29, T30S, R38E, MDM, south side of Koehn Lake 2½ miles east southeast of Cantil	Mrs. M. E. Brehme, Hollister (1956). Leased to Antelope Valley Agricultural Gypsite Co., D. F. Halsey, Rosamond (1953-1956)		See text. (Calif. Bur. Chemistry 53-56).
392	Handel deposit	Sec. 13, T26S, R20E, MDM, in the Lost Hills, 26 miles west of Wasco	Undetermined, 1958; leased to Handel and Son, Shafter (1941-1944)	Gypsite developed in alluvium on west flank of the Lost Hills	Production reported 1941-1944. (Ver Planck 52:123t).
393	Holloway (H. M. Holloway, Inc., Lost Hills) deposit	Secs. 3, 10, 11, 14, 15, 23, 24, 25, 26, T26S, R20E, Sec. 30, T26S, R21E, MDM, in the Lost Hills, 26 miles west of Wasco	H. M. Holloway, Inc., 714-6th St., Wasco, leases fee land and holds mining claims on Federal Petroleum land under Public Law 585 (1958)		See text. (Hess 10b:14; 20:65; Tucker 21:311; Tucker, Sampson, Oakeshott 49:248 Ver Planck 52:53).
	H. M. Holloway, Inc.		H. M. Holloway, Inc., 714-6th St., Wasco (1958)		See Holloway in text. (Tucker, Sampson, Oakeshott 49:248). Held license to produce gypsum, 60 percent and 70 percent grade for agricultural use from approx. 1934 to present (year ending June 30, 1958). Gypsite from the Lost Hills and deposits in Kings County (California Bur. Chemistry 46-56).

GYPSUM, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
394	Jim's Gypsum Mine	Sec. 31, T27S, R19E, MDM, in Temblor foothills, 6 miles southwest of Blackwells Corner	Undetermined, 1958; leased to Jim's Gypsum Mine, De Bartho & Bohns, Lost Hills (1939, 1940)	Gypsite	Production reported 1939, 1940. (Ver Planck 52:123t).
	Kern County Gypsite Co.-I	McKittrick area		Gypsite	Production reported 1921 and 1922. Deposit worked previously by La Corona Oil and Asphalt Co. (Ver Planck 52: 139t).
	Kern County Gypsite Co.-II		Undetermined, 1958; Kern County Gypsite Co., 100 Pacific St., Bakersfield (1946)		See Kern Lake in text. Held license to produce gypsum for agricultural use, 1946. Gypsite from Kern Lake deposits. (California Bur. Chemistry 46).
	Kern Gypsum Mines		Kern Gypsum Mines, C. F. Casida and Claud Stanphill, 2108 So M St., Bakersfield (1956)		See Sunset oil district in text. Held license to produce gypsum, 60 percent grade for agricultural use, 1954 and 1955. Gypsite from Sunset oil district deposits. Became Belridge Gypsum Mines. (California Bur. Chemistry 54; 55).
395	Kern Lake (Crystal Gypsum Co., Kern County Gypsite Co.-II, Pacific Gypsum Co.) deposits	Secs. 26, 27, 34, T32S, R27E, MDM, 14 miles south-southwest of Bakersfield	Kern County Land Co.		See text. (Hess 10b:23; 20:71; Tucker 21:311; Tucker, Sampson, Oakeshott 49: 247, 249; Ver Planck 52:51).
	C. A. Koehn				See Daly in text. (Ver Planck 52:139t).
	Jennie E. Koehn				See Daly in text. (Ver Planck 52:139t).
	Koehn Lake				See Daly in text (Ver Planck 52:52). See also Halsey in text.
	La Corona Oil and Asphalt Co.	McKittrick area		Gypsite.	Production reported 1908-1913. Deposit worked later by Kern County Gypsite Co.-I. (Ver Planck 52:139t).
	Lost Hills				See Holloway in text. (Hess 10b:14; 20:65; Tucker 21:311; Ver Planck 52:52). See also Fannin, Handel, Roberts Farms Gypsum Mines, Star Gypsum Co., Theta Gypsum Co.
396	McClure Valley (Sunflower Valley)	Secs. 14, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 34, 35, 36, T25S, R18E, MDM, near Devils Den, 12 miles northwest of Blackwells Corner	Undetermined, 1958	Gypsite as much as 3 feet thick grading downward into shale or sandstone. Numerous deposits up to 20 acres in area.	No record of production. (Hess 10b:12; 20:64; Tucker 21:311; Ver Planck 52: 124t). See also Lyman Appel.
397	McKittrick - I (California Gypsum & Mineral Co., McKittrick Agricultural Gypsum Co.)	Unconfirmed locality; reported in S½ sec. 21 or S½ sec. 20, T30S, R22E, MDM, ½ mile east of McKittrick	Undetermined, 1958; leased to McKittrick Agricultural Gypsum Co., P.O. Box 267, McKittrick, (1949)	Gypsite, 3-foot average thickness, lying on Plio-Pleistocene McKittrick formation. Sample analyzed in 1907 contained 85.2 percent gypsum.	Production reported by California Gypsum & Mineral Co., J. M. Anderson, Tulare, 1902, 1903, 1907-1912. Gypsum 65 percent and 70 percent grade, for agricultural use, produced by McKittrick Agricultural Gypsum Co., about 1947 to 1949. (Aubury 06:284; Brown 16:515; Hess 10b:16; 20:67; Tucker 19: 917; 21:312; 29:69; Ver Planck 52:55).
	McKittrick-II				See Telephone Hills in text. (Tucker 29:69).
	McKittrick Agricultural Gypsum Co.		Undetermined, 1958; McKittrick Agricultural Gypsum Co., P.O. Box 267, McKittrick (1949)		See McKittrick-I. (Ver Planck 52:55). Held license to produce gypsum, 65 percent and 70 percent grade, for agricultural use, 1946-1949. Gypsite obtained from McKittrick-I and Telephone Hills deposits. (California Bur. Chemistry 46-49).
	McKittrick Extension Oil Co.	McKittrick area		Gypsite.	Production reported 1915. (Ver Planck 52:140t).
	McKittrick Gypsum Co.				See Telephone Hills in text. (Ver Planck 52:141t).
	Mojave Desert				See Daly in text. (Tucker 29:69; Tucker, Sampson, Oakeshott 49:248).
	Mojave Desert Gypsite Co.		Mojave Desert Gypsite Co., P.O. Box 467, Lindsay (1958)		See Daly in text. Held license to produce gypsum, 70 percent grade, for agriclutural use, 1956 to present (year ending June 30, 1958). Gypsite from Daly deposit. (California Bur. Chemistry 56).

GYPSUM, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Monolith Portland Cement Co.				See Telephone Hills in text. (Tucker, Sampson, Oakeshott 49:248; Ver Planck 52:56).
	Mountain States Uranium Corp.--Agricultural Gypsite Div.		Mountain States Uranium Corp.--Agricultural Gypsite Div., P.O. Box 1226, Lancaster (1954)		See Daly in text. Held license to produce gypsum, 70 percent grade, for agricultural use, 1954. Gypsite from Daly deposit. (California Bur. Chemistry 54).
	Pacific Gypsum Co.		Pacific Gypsum Co., P.O. Box 563, Bakersfield (1950)		See Kern Lake in text. (Tucker, Sampson, Oakeshott 49:249; Ver Planck 52:52). Held license to produce gypsum, 60 percent and 70 percent grade; for agricultural use, 1946-1951. (California Bur. Chemistry 46-51).
	Pacific Gypsum Corporation		Pacific Gypsum Corp., P.O. Box 33, Cantil (1946)		See Daly in text. Held license to produce gypsum for agricultural use, 1946. (California Bur. Chemistry 46).
	Packwood Canyon				See Packwood Creek (Ver Planck 52:56).
398	Packwood Creek (Carriso, Packwood Canyon)	Secs. 4, 9, T27S, R18E, MDM, 10 miles west of Blackwells Corner	Numerous parcels of multiple-ownership fee land. Leased to C. L. Fannin, Route 1, Box 7, Wasco, (1948 to about 1951)	Gypsite developed on alluvial gravel in stream basin.	Production of gypsum, 60 percent grade, for agricultural use, 1948-1951. (Ver Planck 52:56).
	Pampa Gypsum Mining Co.				See Cottonwood Creek in text. (Angel 90:223; Ver Planck 52:136t).
	Purity Gypsum Mines		Purity Gypsum Mines C. F. Casida, 715 34th St., Bakersfield (1954)		See Round Mountain in text. Held license to produce gypsum, 40 percent and 50 percent grade, for agricultural use, 1953 and 1954. Gypsite from Round Mountain deposits. (California Bur. Chemistry 53; 54).
399	Reward	S½ sec. 3, SE¼ sec. 4, T30S, R21E, MDM, in Frazer Valley, 1½ miles northwest of Reward	Undetermined, 1958	Gypsite, average thickness 2 feet lying on gypsiferous shale of the Plio-Pleistocene McKittrick formation. Much of the gypsite is comparatively low in grade and contains stones.	Old loading chute in NE¼SE¼ sec. 3 indicates early mining, perhaps about 1900. Probably in 1957 at least 5 separate areas totaling 50 to 75 acres were worked. Idle in March 1958.
400	Roberts Farms Gypsum Mines	Sec. 13, T26S, R20E, MDM, in the Lost Hills, 26 miles west of Wasco	Associated Oil Co., (1955). Leased to Roberts Farms Gypsum Mines, P.O. Box 307, McFarland, (1952, 1953)	Gypsite developed in alluvium on the west flank of the Lost Hills.	Held license to produce gypsum, 50 percent grade, for agricultural use, 1952 and 1953 (California Bur. Chemistry 52; 53).
401	Round Mountain (Purity Gypsum Mines)	Sec. 24, T28S, R28E, MDM, near Round Mountain, 8½ miles northeast of Bakersfield	Undetermined, 1958; leased to Purity Gypsum Mines, C. F. Casida, 715-34th St., Bakersfield (1953, 1954)		See text.
	Star Gypsum Co.	Eastern part T26S, R20E, MDM, in the Lost Hills, 26 miles west of Wasco	Undetermined, 1958; leased to Star Gypsum Co., P.O. Box 204, Lost Hills (1943, 1944)	Gypsite developed in alluvium on the west flank of the Lost Hills.	Production reported 1943, 1944. (Ver Planck 52:145t).
	Sunflower Valley				See McClure Valley. (Hess 10b:12; 20:64; Tucker 21:310).
402	Sunset	Sec. 18, T11N, R23W, SBM, 2 miles southeast of Maricopa	Undetermined, 1958	Small, thin gypsite deposits lying on shale.	Undeveloped (Ver Planck 52:124t).
403	Sunset oil district (Bitter Creek, Foster Trucking Co.-Gypsum Dept., Kern Gypsum Mines)	N½ sec. 27, N½ sec. 28, T11N, R23W, SBM, 4½ miles southeast of Maricopa	Kern Gypsum Mines, C. F. Casida and Claud Stanphill, 2108 So. Main St., Bakersfield (1955)		See text. (Brown 16:516; Crawford 94:324; Hess 10b:19; 20:70; Watts 93:233; 94:35).
	Superior Gypsum Co.		Superior Gypsum Co., Albert Chanley, 3916 Pierce Road, Bakersfield (1958)		See Bitterwater Creek in text. Held license to produce gypsum for agricultural use, 1950 to present (year ending June 30, 1958). Gypsum from Bitterwater Creek deposit; gypsite from deposits in San Luis Obispo County. (California Bur. Chemistry 50-56).

GYPSUM, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
404	Telephone Hills (Abbott & Hickox, Ebbott & Hickox, McKittrick-II, McKittrick Gypsum Co., Monolith Portland Cement Co.)	Secs. 29, 30, 31, 32, T30S, R22E, secs. 5, 8, T31S, R22E, MDM, 1 to 3 miles south of McKittrick	Numerous parcels of multiple-ownership fee land		See text. (Brown 16:515; Hess 10b:17; 20:68; Tucker 21:312; 29:69; Tucker, Sampson, Oakeshott 49:248; Ver Planck 52:55).
405	Temblor Gypsum Co.	Sec. 1, 11, 14, T29S, R20E, MDM, in Belridge area, 12 miles northwest of McKittrick	Undetermined, 1958; leased to Temblor Gypsum Co., Carrisa Plains Star Route, Box 80, Santa Margarita (1958)		See text. Held license to produce gypsum, 60 percent, 65 percent and 70 percent grade, for agricultural use, 1956 to present (year ending June 30, 1958). (California Bur. Chemistry 56).
	Theta Gypsum Co.	Eastern part T26S, R20E, MDM, in the Lost Hills, 26 miles west of Wasco	Undetermined, 1958; leased to Theta Gypsum Co., C. F. Casida, Lost Hills (1941-1943)	Gypsite developed in alluvium on the west flank of the Lost Hills.	Production reported 1941-1943. (Ver Planck 52:145t).
	Valley Agricultural Gypsum Co.	Approx. T28S, R20E, MDM, in Belridge area, 15 miles northwest of McKittrick	Undetermined, 1958; leased to Valley Agricultural Gypsum Co., M. M. Harris, Mgr., P.O. Box 186, Shafter (1939-1943)	Gypsite	Production of gypsite, 70 percent grade, reported 1939-1941. Deposit held later by Coloma Gypsum Mines. (Ver Planck 52:146t).
	Western Gypsum Co.		Western Gypsum Co., J. W. Vils, 733 Maple St., Wasco (1953)		Held license to produce gypsum, 60 percent and 70 percent grade, for agricultural use, 1946-1953. Gypsite from Telephone Hills until approx. 1950; after 1950 from Belridge area (California Bur. Chemistry 46-53; Ver Planck 52:55, 147t).
406	Western Petroleum Co.	W½SE¼NW¼ sec. 20, T30S, R22E, MDM, ½ mile west of McKittrick	Western Petroleum Co. (1904)	Gypsite	No record of production. (Aubury 04:19t; 06:284; Ver Planck 52:147t).

The largest group of workings extends from SW¼ sec. 32, T. 30 S., R. 22 E., M.D.M., 1¼ miles south to SW¼ sec. 5, T. 31 S., R. 22 E., M.D.M., along a valley at the east edge of the Telephone Hills. Probably gypsite was first mined from a long, narrow, crooked excavation, about 20 feet deep, that follows the east side of the valley. Later, it was partly obliterated by numerous transverse cuts, probably made in a search for additional gypsite. Perhaps still later, gypsite was mined from the west slope of the valley, particularly in NW¼ sec. 30, T. 30 S., R. 22 E., and NW¼ sec. 8, T. 31 S., R. 22 E., M.D.M. Another group of workings, in NE¼ sec. 31, T. 30 S., R. 22 E., consists of shallow workings on a low ridge between two washes and along their banks. On the hill in SW¼ sec. 30, T. 30 S., R. 22 E., M.D.M., gypsite has been taken from a number of broad, shallow excavations that have a total area of 50 to 75 acres. In SE¼ sec. 31, T. 30 S., R. 22 E., the overburden has been stripped from a small deposit of unusually compact gypsite. As exposed in a small gully, the gypsite rests on gravel composed of angular shale fragments; and the gravel is underlain by steeply dipping shale. Gypsite probably was mined from shallow excavations along the east edge of sec. 29, T. 30 S., R. 22 E., M.D.M., on both sides of State Highway 33, but little if any trace of gypsite remains in them.

Iron

Several iron ore prospects are known in Kern County (fig. 66), but none has been mined and most are of subcommercial grade. At the Iron Mountain deposit in the Woody district concentrations of magnetite are found in schist near a tactite body. Four miles west of Breckenridge Mountain at the Iron Mountain No. 1 and 2 deposit a hematite-rich zone in schist strikes northeast and dips 45° SE. A third deposit, known as the Sam Emidio deposit, is about 25 miles west of Lebec near the Kern-Ventura County line. There, hematite-rich layers in a zone 50 to 400 feet wide are present in schist. Most of the tin deposits in the Gorman tin district contain iron-rich tactite and gossan. These bodies, probably the richest iron concentrations in the county, consist mostly of magnetite and hydrous iron oxides, but are not large enough to warrant mining for common iron ore.

IRON

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Butler prospects			Iron-rich tactite and gossan.	See Lower Butler and Upper Butler prospects under tin (Wiese, Page 46:32).
	Crowbar Gulch prospect				See under tin (Wiese, Page 46:50).
	Dunton prospect			Iron-rich tactite.	See under tin (Wiese, Page 46:32).
407	Iron Mountain (Iron Mountain Wonder) prospect	NW¼ sec. 10, T26S, R29E, MDM, Woody dist., 1 mile southwest of Woody, on Iron Mt.	Mr. Remick Albitre, Woody (1957)	Concentrations of magnetite in pre-Cretaceous schist near large mass of tactite. Crest of hill is composed of schist, quartzite, and garnetized calcareous rocks. Lower areas are underlain by quartz diorite. Traces of scheelite and copper were noted in the tactite.	Developed by crosscut adit driven at least 200 feet S. 45° E. beneath large tactite zone; 60-foot shaft on top of ridge. Prospected for copper about 1900. (Brown 16:480; Eric 48: 255t; Tucker 29:56; Tucker, Sampson, Oakeshott 49:270t).
	Iron Mountain Nos. 1, 2 prospect				See Mount Breckenridge. (Aubury 04:11t, 19t; Brown 16:516).
	Kim B. claims				Claims at San Emidio deposit in 1958.
	Lake Castaic deposit	Reported in sec. 33, T9N, R18W, SBM (proj.), 4 miles northeast of Gorman (1886); not confirmed, 1958	Tejon Ranch Co., P.O. Box 1560, Bakersfield (1958)		Probably one of the tin prospects in the Gorman district. See Butler, Dunton, and Meeke prospects. (Putnam 86:503).
	Meeke mine			Iron-rich tactite.	See under tin (Wiese, Page 46:32).
	Mount Breckenridge (Iron Mountain Nos. 1, 2) prospect	NW¼ sec. 4, T29S, R31E, MDM, one mile south of Hoosier Flat, 4 miles west of Breckenridge Mt.	Undetermined, 1957; D. Lutz, Bakersfield (1904)	Hematite-rich micaceous schist from 10 to 200 feet wide strikes NE, dips 45° SE.	Production undetermined. Long idle. (Aubury 04:11t, 19t; Brown 16:516; Tucker 21:312; 29:56; Tucker, Sampson, Oakeshott 49:270t).
408	San Emidio (Kim B, Two to One) deposit	S½ sec. 17, T9N, R21W, SBM, about 9 miles northwest of Frazier Park, low on southeast slope of San Emigdio Mt., at east end of Mill Potrero	G. Breski and R. Cornell, addresses undetermined (1958)	Iron-bearing brecciated metamorphic rocks strike approximately east, dip steeply north, and form dark bands from 30 to 50 feet or more wide and several hundred feet long in paler metamorphic rocks. Iron content of rocks probably low except for thin layers and lenses of moderately pure magnetite and other iron minerals in the dark bands. Some layers of magnetite are from 2 to 4 feet thick and as much as 150 feet long (M. W. Redhead, personal communication, 1959).	Deposit described as early as 1890 but has not been developed except for small excavations. Also contains manganese. Area easily accessible since construction in 1957 or 1958 of new county road between Cuddy Valley and Mill Potrero. No production. (Angel 90:226; Aubury 04:11t, 19t; Brown 16:516; Tucker 21: 312; 29:57; Tucker, Sampson, Oakeshott 49:270t).
	Two to one prospect				See San Emidio deposit. (Brown 16:516; Tucker 29:57).

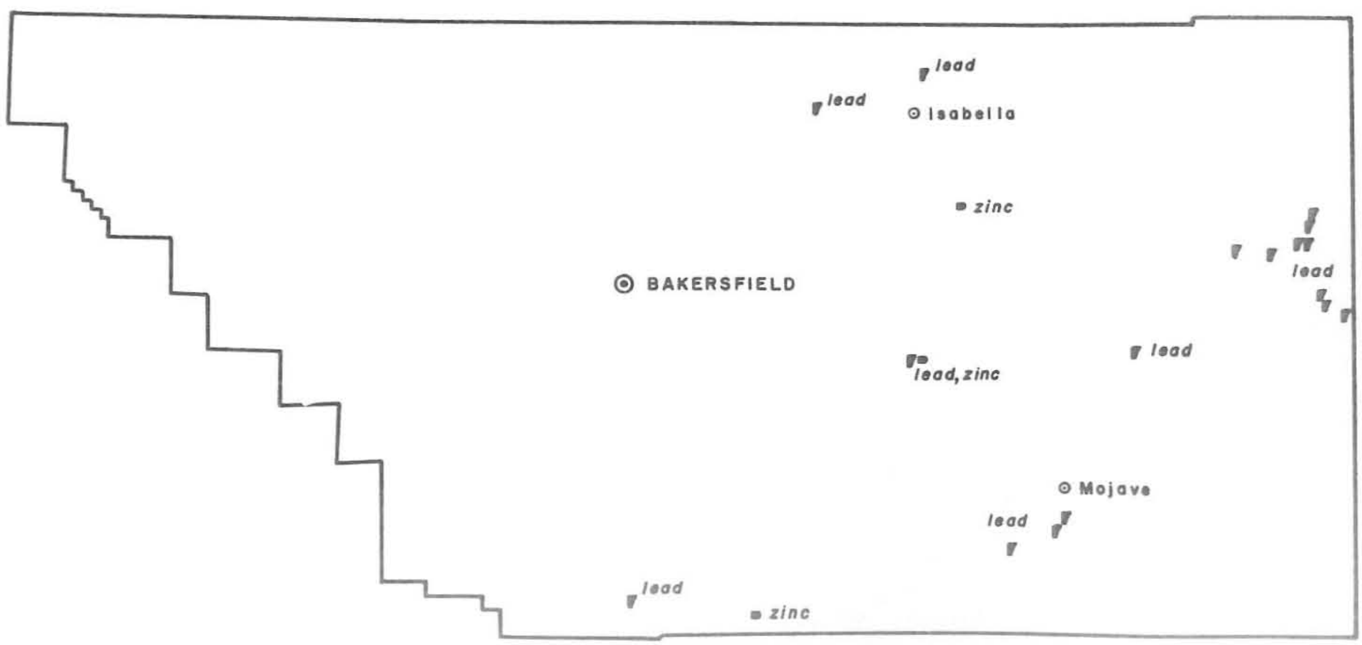


Figure 69. Distribution of lead and zinc deposits in Kern County.

LEAD

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Beehive				See Hoover under silver.
	Big Blue			Galena and other sulfides in gold-quartz veins.	About 69,000 pounds of lead was produced as a byproduct from gold ores between 1932 and 1942. See under gold. (Goodwin 57:526t).
	Black Bob				See under gold. (Goodwin 57:526t).
	Blackhawk				See under zinc in text.
409	Black Jack	Reported in sec. 26 (28?), T26S, R33E, MDM, 2½ miles southeast of old Isabella 1946); not confirmed, 1957	Undetermined, 1958; I. M. Prudy, Lancaster (1946)	East-striking vein in limestone traceable 2,000 feet along strike. Contains lead and zinc minerals.	Probably same as Summit Gp. Thirty tons reported sent to Garfield smelter. Developed by 36-foot shaft. (Bedford and Johnson, 1946, p. 4).
	Black Mountain				See under gold. (Goodwin 57:527t).
	Blue Chief				See under gold. (Goodwin 57:527t; Eric 48:254t).
	Cactus Queen				See text under gold.
410	Carbonate prospect	NE¼ sec. 6, T31S, R37W, MDM, half a mile north of Cinco	Martin Beck, Mojave (1955)	Traces of galena, chalcopyrite, and copper and iron stains in fractured fine-grained granitic rock. Gypsum, clayey gouge, and calcite common in fractures.	Caved shaft and short adit extended S. 80° W. from shaft. A prospect. Idle
	Condor				See Kelso mine in text under zinc.
	Four Star			By-product recovery of 9,271 lbs. lead and 1,823 lbs. copper from gold ore between 1939 and 1942.	See Pride of Mojave mine under gold. (Goodwin 57:528t).
	Golden Queen				See text under gold.
411	Honey Bee prospect	SE¼ sec. 5, T29S, R40E, MDM, 6½ miles northwest of Randsburg, low on southeast flank of El Paso Mts.	S. M. Mingus and others, P.O. Box 94 Randsburg (1958)	Irregular, reddish iron-stained fractures in brecciated thin-bedded argillite and limestone. Fractures and bedding planes strike NW. and dip 30° NE. Iron-stained zone is several tens of feet thick and hundreds of feet long.	Traces of lead mineralization reported by S. M. Mingus (personal communication, 1958). Twenty-foot adit driven NW. in zone of most brecciation. No production.
	Hoover				See under silver.
	Hummer				See Hoover under silver. (Goodwin 57:528t).
	Kelso mine				See text under zinc.
	Lead mine, The	Reported in sec. 35, T27S, R40E, MDM, Rademacher dist. (1904); not confirmed, 1957	Undetermined, 1957; Underwood and McNitt, Bakersfield (1904)	Lead carbonates and sulfide "deposit" with 2 veins 6 inches and 8 inches wide on sides.	Uncorrelated old name; probably long abandoned claim. Developed by 25-foot open cut. (Aubury 04:19t).
	Monarch Rand			Traces of galena in gold-silver veins.	See under gold.
	Quartz	Undetermined	Undetermined, 1958; J. Hudison, Piute (1895)	Undetermined.	Gold mine from which 81 tons of ore mined in 1914 contained 4.10 percent lead, 27 oz. silver, and 2.20 oz. gold per ton. (Goodwin 57:530t).
	Rattlesnake				See under gold. (Goodwin 57:530t).
	Rinaldi and Clark	Undetermined	Undetermined, 1958; Rinaldi and Clark (1913)	Lead-silver-gold mine which yielded 55 oz. gold, 1,200 oz. silver, 33,000 lbs. copper, and 20,000 lbs. lead from 3 shipments totalling 69 tons in 1911-1913 (Goodwin, 1957, p. 531).	Uncorrelated old name. Probably listed herein under different name. (Eric 48:256t; Goodwin 57:531t).
	Robinson	Undetermined	J. H. Robinson, Piute (1908); Monroe E. Bechtel, Kernville (1938)	Gold mine in Caliente dist.	Lead obtained from gold-ore concentrates mined in 1908 and 1938. Mine developed by 50-foot inclined shaft and 80 feet of drifts. (Goodwin 57:531t).
	Santa Ana group				See under gold. (Goodwin 57:532t).
	Smith mine				See under copper.
	Standard group			Recoverable lead and copper in gold ore.	See text under gold. (Goodwin 57:532t).
	Summit group	Reported on east slope of Cook Mt., 2½ miles southeast of Isabella (old site) (1940); not confirmed, 1957	Undetermined, 1957; Pacific Mines Corp., Los Angeles (1929)	Two to 5-foot wide vein containing argentiferous galena.	Probably same as Black Jack mine. Fifteen claims in 1929; principal work consisted of shallow shafts and open cuts on one claim. Thirty-ton shipment to Selby in 1928. Long idle. (Tucker 29:59; Tucker, Sampson, Oakeshott 49:271t).
	Whitmore			Recoverable lead and copper in gold ore.	See text under gold. (Goodwin 57:534t).

LEAD, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Yellow Aster			Minor amount of lead and copper from gold concentrates shipped in 1937.	See text under gold. (Goodwin 57:534t).
412	Undetermined	N½SW¼ sec. 6, T29S, R40E, MDM, 7 miles northwest of Randsburg, high on southeast slope of El Paso Mts.	Undetermined, 1958	Undetermined.	May be one of the lead prospects listed herein. Developed by north-driven adit.

Lead

At least 275,000 pounds of lead has been recovered from ore mined in Kern County (fig. 69). About 108,000 pounds was produced from the Big Blue, Blackhawk, and Rinaldi and Clark mines at intervals between 1911 and 1945. The balance was produced, mostly in lots consisting of a few tens to a few thousand pounds, from small lead deposits and as by-products from gold mines.

The Big Blue mine, in the Cove district, was opened as a gold operation in 1860, but during the period 1934-42 by-product lead was recovered. The Blackhawk mine (described in the *Zinc* section), in the Loraine district, and the Rinaldi and Clark mine, location undetermined, each yielded lead associated with other nonferrous metals.

The principal lead minerals in Kern County are galena (PbS) and cerussite ($PbCO_3$).

Limestone, Dolomite, and Cement

By Cliffton H. Gray, Jr.

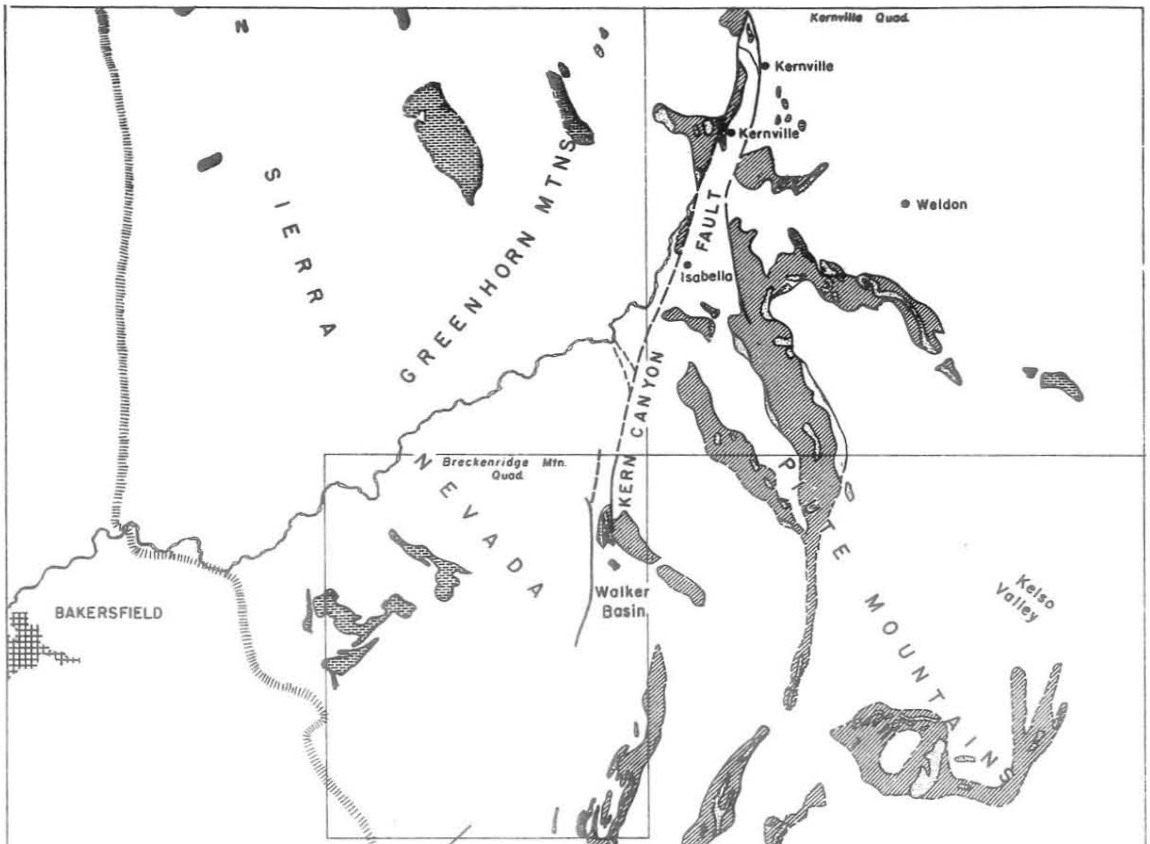
Limestone production in Kern County, a major mineral industry, is estimated from rated plant capacities to be about 2½ million tons each year. In 1958, most of this limestone was consumed in two portland cement plants; one near Tehachapi, and the other near Mojave. Prior to the mid-1920s, large quantities of limestone were mined from deposits in the county as a raw material for lime production. In addition to these deposits and the deposits being currently quarried by the cement companies, the county contains large undeveloped reserves of carbonate rocks. Some of these carbonate bodies appear to be of industrial grade, whereas other bodies are composed of complexly intermixed limestone and dolomite currently unsuitable for industrial use either as limestone or dolomite. Some of the deposits suitable for industrial use are too remote or inaccessible to be of present commercial interest; some more accessible ones probably soon will be placed in production. Because limestone and cement producers in Kern County number fewer than three, production figures in 1957 were included with borates, gem stones, gold, pumice and pumicite, salt, silver, sodium carbonate, tungsten, and uranium ore, which had a combined value of $50,315,054. In 1958, the two portland cement plants had a combined annual capacity of about 11,000,000 barrels of cement.

The production of commercial limestone in Kern County began prior to 1888 with the inception of the lime industry. During 1888, twelve lime kilns were reported as either operating or being constructed (Goodyear, 1888b, p. 309-324), mostly within 5 miles of Tehachapi; one of the few places in Kern County where fuel and limestone were near a railroad. At that time the Summit Lime Company, the principal lime producer in the county, was operating four kilns in Antelope Canyon, 3 miles due south of Tehachapi. One of these is reported (Goodyear, 1888, p. 311) to have had a capacity of about 700 barrels of lime and required 70 cords of wood per firing. Seven other kilns, owned by five different operators, were in Grizzly, Pine Grove, and Antelope Canyons in the north margin of the Tehachapi Mountains. One kiln was about 2 miles east of Tehachapi Station in the foothills north of Tehachapi Valley. The earliest lime kilns were rudely constructed "pot kilns" built of stone; some were brick-lined. Later, limestone was burned in more modern brick and metal kilns. Both oil and wood were used as fuel (Aubury, 1906, p. 69).

The lime industry in Kern County began in the 1880s with the operation of small kilns near Tehachapi which furnished lime for local use. Some of these kilns subsequently were much enlarged, and, in 1894, lime was being shipped to many points in southern California. Lime production in Kern County continued to be of considerable importance until the mid-1920s. Maximum production of 295,613 barrels was reported in 1906, and the last reported production was in 1928 (Logan, 1947, p. 245). The decline in use of lime was due largely to the substitution of concrete construction for masonry construction.

Varicolored marble was quarried before 1900 from the Cluff Ranch and Antelope Valley deposits near Neenach. The Antelope Valley material was used as facing stone in several large buildings in Los Angeles and San Francisco. These quarries have not been a source of marble facing stone since 1904 (Brown, 1916, p. 520; Wiese, 1950, p. 48).

The portland cement industry in Kern County began in 1909 when the City of Los Angeles constructed the Los Angeles Aqueduct wet-process cement plant at



0 2 4 8
MILES

Pendants with mica schist, quartzite and hornfels; not known to contain carbonate rocks.

Pendants with mica schist, quartzite and hornfels; known to contain carbonate rocks.

Lenses known to consist mostly of carbonate rocks.

Compiled from published maps of Simpson (1943); Miller and Wells (1940); Wiese (1950); Crowell (1952); Dibblee and Chesterman (1953); and from reconnaissance mapping by B. W. Troxel, P. K. Morton, C. H. Gray, Jr., and O. E. Bowen, Jr., of the California Division of Mines (1954-1959).

Figure 70. Sketch map of central Kern County showing distribution of carbonate- and non-carbonate-bearing metasedimentary rocks.

Monolith Station, 4 miles east of Tehachapi. The cement was used in the construction of the Owens River water supply system between Haiwee Reservoir in Inyo County and San Fernando Reservoir in Los Angeles. Limestone was obtained initially from a deposit near the Summit Lime Company quarry 3 miles south of Tehachapi, but since 1912 a deposit 2 miles northwest of the plant has been the principal source of limestone. By 1916, more than 900,000 barrels of cement had been produced by the City of Los Angeles under the brand name of "Monolith". In 1921, after lying idle for several years, the plant was purchased and reactivated by the Monolith Portland Cement Company who made immediate plans to increase the daily capacity from 1,200 barrels to 3,000 barrels (Hamilton, 1922, p. 51). In 1958, this plant had a rated annual capacity of about 4,745,000 barrels.

During 1954, the California Portland Cement Company began construction of a dry-process plant, known as the Creal plant, 9 miles west of Mojave. The production of portland cement was begun in December 1955. The initial capacity was about 2,200,000 barrels per year, but by October 1958, the annual capacity was reported to have been increased to more than 6,000,000 barrels (Utley, 1958, p. 93). Limestone is obtained near the plant from two quarries about 1 mile apart and in separate pendants. These pendants are two of the several large bodies of limestone along the southern and southeastern part of the Tehachapi Mountains (fig. 70).

In 1958, Kern County limestone was first used for whiting. This material was obtained from a deposit near Isabella. In 1959, limestone bodies in the vicinity of Frazier Park were the first substantial and productive source of white roofing granules in the county.

General Geology of the Limestone-Bearing Regions

Limestone and dolomite bodies in Kern County are in roof pendants of weakly to strongly metamorphosed marine sedimentary rocks scattered in intrusive rocks which range in composition from granite to gabbro. The metamorphic rocks also include quartzite, argillite, phyllite, schist, slate, and hornfels, as well as contact-metamorphic rocks along the borders of the pendants. Few of the metamorphic bodies have been mapped in detail and little direct evidence of the age of the original strata has been found. Although only fragmentary fossil evidence has been reported (Goodyear, 1888, p. 310; Wiese, 1950, p. 18), most of these strata are believed to be late Paleozoic in age, based largely on their similarity to established sections in the Inyo Range and Randsburg area (Crowell, 1952; Dibblee, 1952; Dibblee and Chesterman, 1953; Miller and Webb, 1940; Wiese, 1950). Some of the metamorphic rocks, however, have been considered to be probably in part Triassic and possibly in part Jurassic because lithologically they are similar to known Triassic rocks of the Inyo Range (Simpson, 1934, p. 383). Most of the pendants are in the eastern half of Kern County which is underlain mostly by granitic rock of the Sierra Nevada batholith. The batholith is now believed to be probably early Late Cretaceous in age (Larsen and others, 1958, p. 35). Some of the pendants are large, as much as 25 miles long and 4 miles wide, continuous, and free of intrusive rocks; others are small, with maximum dimensions of only a few hundred feet, or contain high proportions of granitic rocks.

The Limestone Bodies

Most of the limestone and dolomite deposits in Kern County lie in two distinct belts of metasedimentary rocks. One belt trends northeast and extends from the vicinity of Frazier Park, near the southwest corner of the county, along the southeastern flank of the Tehachapi Mountains to the foothills a few miles west of Mojave. The other belt extends north from a point about 4 miles south of Tehachapi, through the east central part of the county in the Sierra Nevada, to Isabella and Kernville and into Tulare County along Kern River Canyon (fig. 70). The north-trending belt lies northwest of the Garlock fault, and the northeast-trending belt lies mostly southeast of the fault and is essentially parallel with the fault.

North-Trending Belt. The north-trending belt occupies a 50-mile-long and 25-mile-wide segment in the middle of the southern Sierra Nevada. Pendants within it are lenticular or elongate to very irregular in plan. Most of the metasedimentary rock is contained in about 15 pendants, each 4 or more miles long and half a mile or more wide. The largest pendant, in the vicinity of Isabella, is about 25 miles long and 4 miles in maximum width. Most of the pendants trend approximately northward; some are oriented slightly west or east of north, and a few trend east.

The pendants are chiefly mica schist, quartzite, and hornfels, but most also contain carbonate rocks. These carbonate rocks appear from surface exposures to comprise 15 to 30 percent of the volume of the major pendants. The lenticular carbonate bodies range from small masses only a few tens of feet long to large elongate bodies as much as 6 miles long and half a mile wide. Irregular carbonate bodies range from blebs only a few tens of feet in diameter to masses as much as 4 miles in diameter. Other irregular bodies are a mile or more long and half a mile wide. Much of the carbonate rock is intimately mixed with schist and quartzite and much is dolomitic or dolomite. In many places the dolomite occurs as irregular replacement patches in limestone. In other places entire masses of carbonate rock are dolomitic. In still other places the dolomite is in discrete mineable bodies. Commonly the layering or stratification within individual carbonate rock bodies is essentially parallel to the long dimension of the pendants and to the general trend of the belt.

Large bodies of metamorphic rocks in the areas adjacent to the valleys of the Main Fork and South Fork of the Kern River and in the Piute Mountains, in the central Sierra Nevada, were named the "Kernville series" by Miller (1931, p. 331-360), and later mapped by Miller and Webb (1940, p. 343-378). This series is made up largely of phyllite, quartzite, and crystalline limestone

and dolomite. The carbonate rock bodies are lenticular and range in size from lenses only a few tens of feet long to elongate bodies as much as 6 miles long and half a mile wide. The limestones are mostly white to bluish-gray, thick-bedded and fine to moderately coarse grained. Beds of white limestone, as much as several feet thick, are interlayered with bluish-gray and banded white limestone. Mineable bodies of this limestone, of commercial grade and as much as 300 feet thick, are known. Many of the carbonate bodies within 10 to 15 miles south and southeast of Lake Isabella are mixed dolomite, dolomitic limestone, and limestone, and as such they are currently unsuitable as a source of limestone for portland cement and other industrial uses that require material of a specific chemical composition. The limestone in the Kernville-Isabella area was first mined in 1958 when the Kennedy Minerals Company opened a small quarry 6½ miles east of new Isabella. The limestone was used as whiting.

In the vicinity of Breckenridge Mountain, 20 miles east of Bakersfield, Dibblee and Chesterman (1953, p. 12-22) found metasedimentary rocks similar to the Kernville series. These metasedimentary rocks consist of schist, quartzite, and crystalline limestone of Carboniferous (?) age and of the Pampa schist of Paleozoic or early Mesozoic age. The limestone crops out prominently at a point on Tweedy Creek 1½ miles northeast of Keene and about 2 miles south of the Breckenridge Mountain quadrangle, and extends north-northeast about 6 miles across the southeastern part of the quadrangle and beyond to Caliente Creek. The limestone is in north-trending vertical to steeply east-dipping en echelon lenses as much as 100 feet thick, some of which are at least 1 mile long (Dibblee and Chesterman, 1953, p. 16). The limestone is generally pale gray, fine grained and thick bedded. Bodies metamorphosed to a higher degree contain coarsely crystalline white marble. The carbonate-bearing sequence also includes calc-silicate rocks, which crop out mostly north of Walker Basin. Carbonate rocks north of Walker Basin have not been utilized as a source of commercial limestone, but pendants along Tweedy Creek were the source of many thousands of tons of limestone for lime burning during the early 1900s.

The pendants near Tehachapi have been a source of commercial limestone since the 1880s, first for the lime industry and since 1909 for the portland cement industry. The largest mined pendant is the Monolith Portland Cement Company deposit, 2 miles northeast of Tehachapi. This pendant is crudely triangular in plan, about 3 miles long, and 2 miles wide. The pendant contains quartzite, schist, and a carbonate mass that is more than 3,500 feet long and 2,500 feet wide. In the quarry area the limestone is about 800 feet thick and is underlain by quartzite and schist more than 500 feet thick.

Northeast-Trending Belt. The northeast-trending belt occupies the southern and southeastern foothills of the Tehachapi Mountains. This belt is about 35 miles long and 4 miles wide. The pendants are not as lenticular as those in the north-trending belt; most are elongate to nearly ovoid in plan with irregular borders, but the two largest pendants are irregular masses. The pendants in this belt are much smaller but more numerous than in the north-trending belt, and commonly contain a higher proportion of carbonate rock. Most of the metasedimentary rock is contained in some seven major pendants ranging from 1 to 4 miles in length and from half a mile or less to 3 miles in width; and in about 50 minor pendants most of which range in length from 100 to 2,000 feet; though some are as much as 1 mile long and a quarter of a mile wide. The largest pendant, west of Cottonwood Canyon, is about 4 miles long and 3 miles wide. Most of the pendants trend northeast. Layering within the bodies is commonly parallel with their long dimension.

The pendants east of Cottonwood Creek, in the Elizabeth Lake quandrangle, consist mostly of schist, quartzite, slate, hornfels, metavolcanic rock, and coarsely crystalline limestone. This series of metamorphic rocks was named the Bean Canyon series by Simpson (1934, p. 371-415), who tentatively dated the series as probably in part Triassic and possibly in part Jurassic. The carbonate rocks comprise perhaps 10 to 15 percent of the volume of most pendants, but a few are chiefly carbonate rock. Three limestone bodies about 80, 20, and 150 feet thick, and separated by schist and quartzite, are exposed in Bean Canyon. Other bodies, as much as 1,500 feet thick, composed mostly of carbonate rock, are exposed in larger pendants 1 mile to the west. The limestone is white or gray and ranges from thin-bedded to coarse-bedded. Except for some bodies which contain intermixed dolomite, much of the carbonate rock appears to be suitable for use in portland cement. The probable chemical grade is indicated by a few analyses (tables 11, 12). Limestone from the Bean Canyon series has been mined in only one area. Large bodies exposed east of the Willow Spring road have been mined since 1955 as the source of limestone for the Creal plant of the California Portland Cement Company.

West of Cottonwood Creek, in the southern Tehachapi Mountains north of Antelope Valley, metamorphosed sedimentary rocks are found in the Neenach quadrangle (Wiese, 1950) and to the west in the Lebec quadrangle (Crowell, 1952). About 75 percent of the volume of these rocks is carbonate rock. These metamorphic rocks are tentatively dated as Paleozoic (Wiese, 1950, p. 18; Crowell, 1952, p. 6) and Wiese (1950, p. 18) points out that these rocks probably are not the same as the Bean Canyon series. According to Wiese (1950, p. 16-18) the metamorphic series in the Neenach quadrangle consists mostly of bluish-gray to white limestone and marble, but also contains quartzite and hornfels. A sequence which crops out north of Quinn Ranch contains 4,000 feet of bluish-white coarse-grained marble; 2,500 feet of gray and reddish sandy limestone, quartzite, and hornfels; and 2,500 feet of medium-grained to coarsely crys-

Table 11. Chemical analyses of limestone and dolomite deposits in Kern County.

Location—See entry in tabulated list for detail	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	P_2O_5
* Bean Canyon area (west side of major drainage channel 1 mi. SW of Bean Canyon). Random samples of middle limestone lens.	.10 .04	.04 .04	.06 .04	51.15 54.00	1.51 1.48	.01 .02
* Tecuya (Cuddy Canyon, Kramer) deposit. Random samples from south face of main limestone outcrop near road. Samples 1-5 (see fig. 75).	.14 2.60 .06 1.06 .08	.07 .15 .02 .13 .03	.35 .57 .06 .55 .07	54.80 52.74 53.40 53.38 53.80	.45 .83 1.87 1.20 1.54	.04 .03 .02 .02 .03
* Marble Spring Canyon deposit	2.42	.06	.82	28.89	21.06	.02
* Sand Springs Canyon deposit. Sample 6 (see fig. 75)	.16	.04	.09	53.83	1.63	.03
* White Ridge deposit. Sample 7 (see fig. 75)	.36	.47	.25	29.49	21.62	.01
** Cluff Ranch marble deposit. Random sample from quarry face, SE¼ sec. 31, T. 10 N., R. 16 W., S.B.M.	.42	.076	1.10	32.50	19.66	nil
** Dark Canyon deposit. Random sample from NE¼NW¼ sec. 25, T. 30 S., R. 34 E., M.D.M.	16.86	.029	.33	40.90	5.18	.282

* Analyses by Abbot A. Hanks, Inc., San Francisco, 1955.
** Analyses by Pittsburgh Testing Laboratory, San Francisco, 1959.

talline bluish-gray marble. Between Cottonwood and Little Sycamore canyons, about 3,000 feet of marble with minor amounts of calc-silicate hornfels make up a sequence. Numerous smaller bodies of carbonate rock, enclosed in granitic rock, are present to the northeast between Antelope Canyon and Cottonwood Creek. Much of the carbonate rock is limestone, some is dolomitic limestone, and discreet masses of fine-grained crystalline dolomite are known, as at Marble Spring Canyon and Cluff Ranch (table 11).

A large mass and several smaller bodies of limestone and marble with minor amounts of schist, quartzite, and hornfels were mapped by Crowell (1952) in the Lebec quadrangle adjoining the Neenach quadrangle on the west and about 5 miles east of Lebec. Here the limestone consists in part of an aggregate of coarse, interlocking, bluish crystals of calcite. Some of the limestone is pure, but some contains zones of dolomitic limestone, intermixed streaks of graphite, and thin lenses of quartzite, calc-silicate hornfels, and iron-stained tactite. Lenses of high-calcium limestone, as much as 1,000 feet wide and one mile long, are in the metamorphic series (fig. 76, table 13).

The masses of carbonate rock that lie along the south margin of the Tehachapi Mountains have been mined from three small quarries in the Neenach quadrangle.

Table 12. Chemical analyses of "Bean Canyon series" limestone (Creal deposit) exposed along Willow Spring Road, sec. 27, T. 11 N., R. 14 W., S.B.M.

Analyses by Abbot A. Hanks, Inc., San Francisco (1953).

Location (see fig. 74)	Insoluble	R_2O_3 ($Fe_2O_3 + Al_2O_3$)	CaO	MgO	P_2O_5
Willow Springs Road samples	1.44 0.50 0.80 0.64 0.52 0.32 0.36 0.16 0.14 0.32 0.44	0.48 0.28 0.28 0.16 0.14 0.26 0.30 0.20 0.20 0.22 0.22	53.60 54.38 54.25 54.37 54.32 54.59 49.31 53.97 54.65 53.20 53.23	1.10 0.01 0.94 1.01 0.93 0.98 5.40 1.55 0.97 1.92 2.06	0.03 0.03 0.03 0.03 0.01 0.02 0.02 0.01 0.04 0.01 0.03

Location (see fig. 74)	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	P_2O_5
Willow Pass Hill, 25 feet (slope distance) above quartz monzonite contact on west face of hill	.26	.07	.17	53.20	1.91	Trace
Willow Pass Hill, 40 feet (slope distance) above quartz monzonite contact on west face of hill	.36	.19	.45	52.90	1.85	Trace

Table 13. Chemical analyses of Microwave Station area of limestone, 5½ miles northeast of Lebec, southeast of Bear Trap Canyon, secs. 22, 23, 26, 27 (proj) T. 9 N., R. 18 W., S.B.M.

Analyses by Abbot A. Hanks, Inc., San Francisco (1955)

Location (see fig. 76)	Sample no.	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	P_2O_5
Traverse along Microwave Station road							
0 to 50 feet west of east edge of deposit	1	.44	.08	.22	54.45	.80	Trace
50 to 90 feet west of east edge of deposit	2	.19	.06	.13	54.49	.97	.01
90 to 130 feet west of east edge of deposit	3	.48	.11	.30	53.69	1.34	.01
130 to 170 feet west of east edge of deposit	4	.46	.06	.20	53.79	1.33	.01
170 to 210 feet west of east edge of deposit	5	.22	.03	.15	53.27	1.91	Trace
210 to 250 feet west of east edge of deposit	6	.40	.09	.19	53.44	1.71	Trace
250 to 290 feet west of east edge of deposit	7	.49	.06	.26	54.26	.98	.01
290 to 330 feet west of east edge of deposit	8	.18	.07	.11	54.47	.96	.01
330 to 370 feet west of east edge of deposit	9	.18	.35	.16	41.14	12.42	Trace
370 to 410 feet west of east edge of deposit	10	.07	.03	.06	54.69	.83	.01
410 to 450 feet west of east edge of deposit	11	.10	.05	.08	54.44	.97	.01
450 to 490 feet west of east edge of deposit	12	.12	.04	.10	54.45	1.04	.01
490 to 530 feet west of east edge of deposit	13	.18	.04	.12	54.29	1.03	.02
530 to 570 feet west of east edge of deposit	14	.14	.04	.10	54.47	.99	Trace
570 to 610 feet west of east edge of deposit	15	.06	.02	.05	54.24	1.21	Trace
610 to 650 feet west of east edge of deposit	16	.16	.03	.07	54.36	1.07	.01
650 to 690 feet west of east edge of deposit	17	.20	.04	.12	53.58	1.65	.02
690 to 730 feet west of east edge of deposit	18	.20	.03	.12	54.07	1.31	.01
730 to 770 feet west of east edge of deposit	19	.24	.07	.11	54.24	1.14	.01
770 to 810 feet west of east edge of deposit	20	1.40	.10	.84	53.27	.78	.06
810 to 850 feet west of east edge of deposit	21	3.90	.11	1.33	51.65	.76	.08
850 to 890 feet west of east edge of deposit	22	.36	.06	.26	54.45	.83	.01
890 to 930 feet west of east edge of deposit	23	.48	.08	.28	54.27	.88	.02
930 to 970 feet west of east edge of deposit	24	2.64	.17	1.09	50.66	2.22	.04
970 to 1010 feet west of east edge of deposit	25	4.00	.62	1.72	42.16	8.20	Trace
Random sample from old road							
100 feet below Microwave Station road	26	.20	.04	.14	53.77	1.56	Trace
100 feet below Microwave Station road	27	.17	.03	.12	54.43	.99	.01
100 feet below Microwave Station road	28	.32	.02	.20	54.34	.95	.03
Random sample along trend of the ridge 1,000 feet SE of Microwave Station road	29	.16	.04	.14	54.35	.95	.04
Random sample along trend of the ridge 1,300 feet SE of Microwave Station road	30	.26	.06	.20	54.28	1.01	.01
Random sample along trend of the ridge 1,700 feet SE of Microwave Station road	31	.26	.05	.21	53.68	1.45	.02

These quarries, idle for many years, furnished marble for building stone and rubble. Several of the largest masses, however, appear to be suitable, at least in part, for use in portland cement (fig. 70, table 11). In respect to water supply, transportation, and availability of other raw materials for manufacturing portland cement, the limestone deposits along the southern and southeastern margins of the Tehachapi Mountains are more favorably situated than most hitherto unused masses of limestone in Kern County.

Field studies to date suggest that the limestone pendants of the northeast-trending belt which crop out as a discontinuous chain along the southern Tehachapi Mountains between Mojave and Frazier Park possibly are equivalent or partly equivalent in age to the limestone-bearing units of the north-trending belt that crop out near Tehachapi and Monolith. These Monolith-Tehachapi limestone deposits probably are the southern continuation of the limestone pendants in the vicinity of Isabella and Kernville.

Other Limestone Bodies. In addition to the north-trending and northeast-trending carbonate-rock-bearing belts, other limestone-bearing pendants are found at widely separated localities in the county. Masses of carbonate rock lie south and west of San Emigdio Creek at Blue Ridge, in the southwest part of the county, and trend nearly eastward. About 40 limestone pendants, the largest of which is about 2 miles long and a third of a mile wide, but most of which are about a quarter of a mile long and an eighth of a mile wide, are in the San Emigdio Mountains north and west of Frazier Park. These pendants contain mostly carbonate rock in which limestone predominates, but also contain schist and quartzite. They trend northwest to nearly east. These pendants have been mined from several small quarries, long idle, but one of which since mid-1959 has been a

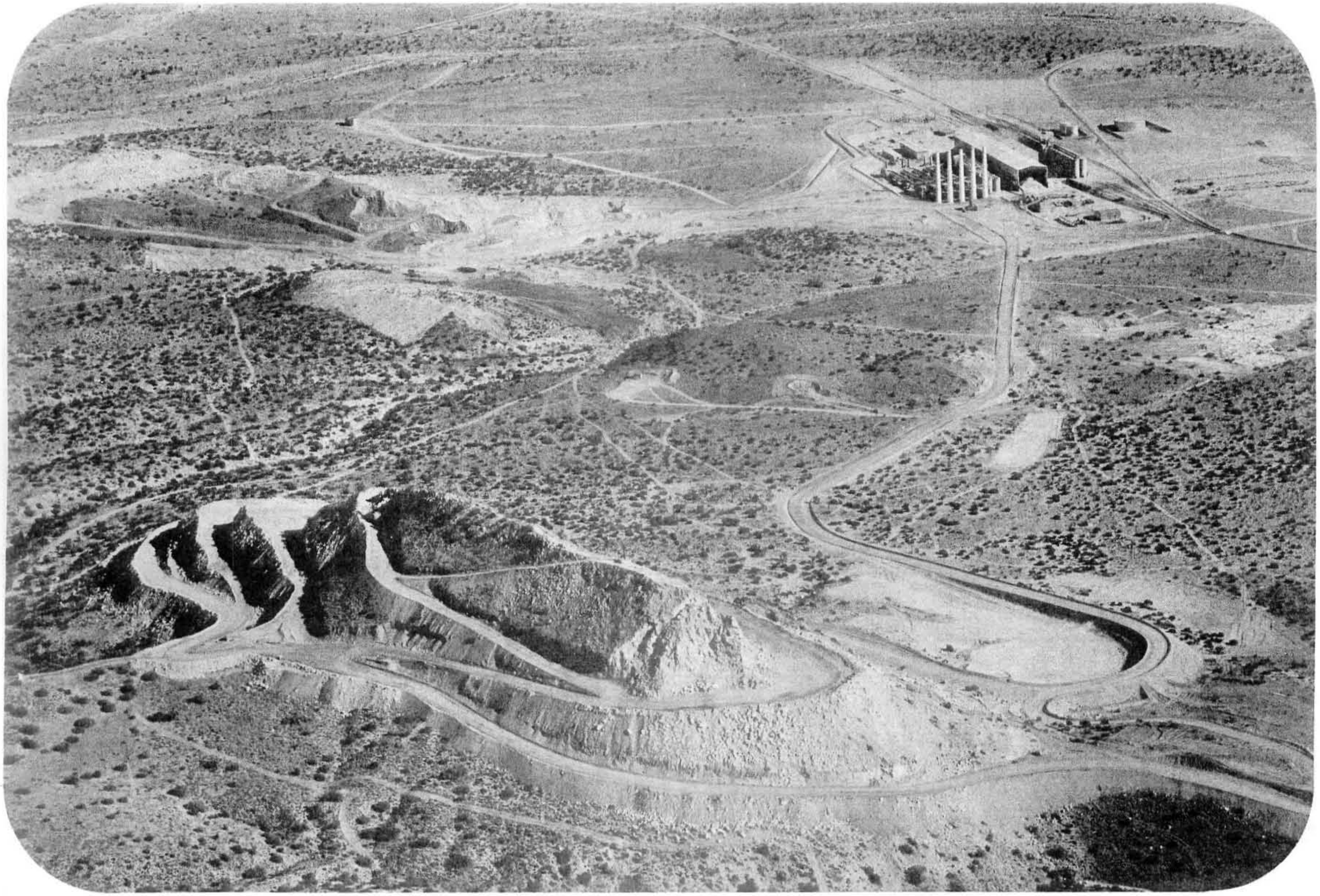


Figure 71. Aerial view to northeast of California Portland Cement Company's Creal plant near Mojave. Main limestone quarry ("sec. 23 quarry") in foreground; cement plant in right background; ("sec. 24 quarry") in left background. Main quarry is source of limestone; sec. 24 quarry is source of limestone, quartzite, and quartz mica schist; and small pits left of middleground left of road are source of alumina-rich schist. Fine-grained material on near slope of main quarry hill is schist removed from hillside. *Photographed 1958 by United Aerial Survey, Tulare, courtesy California Portland Cement Company, Los Angeles.*

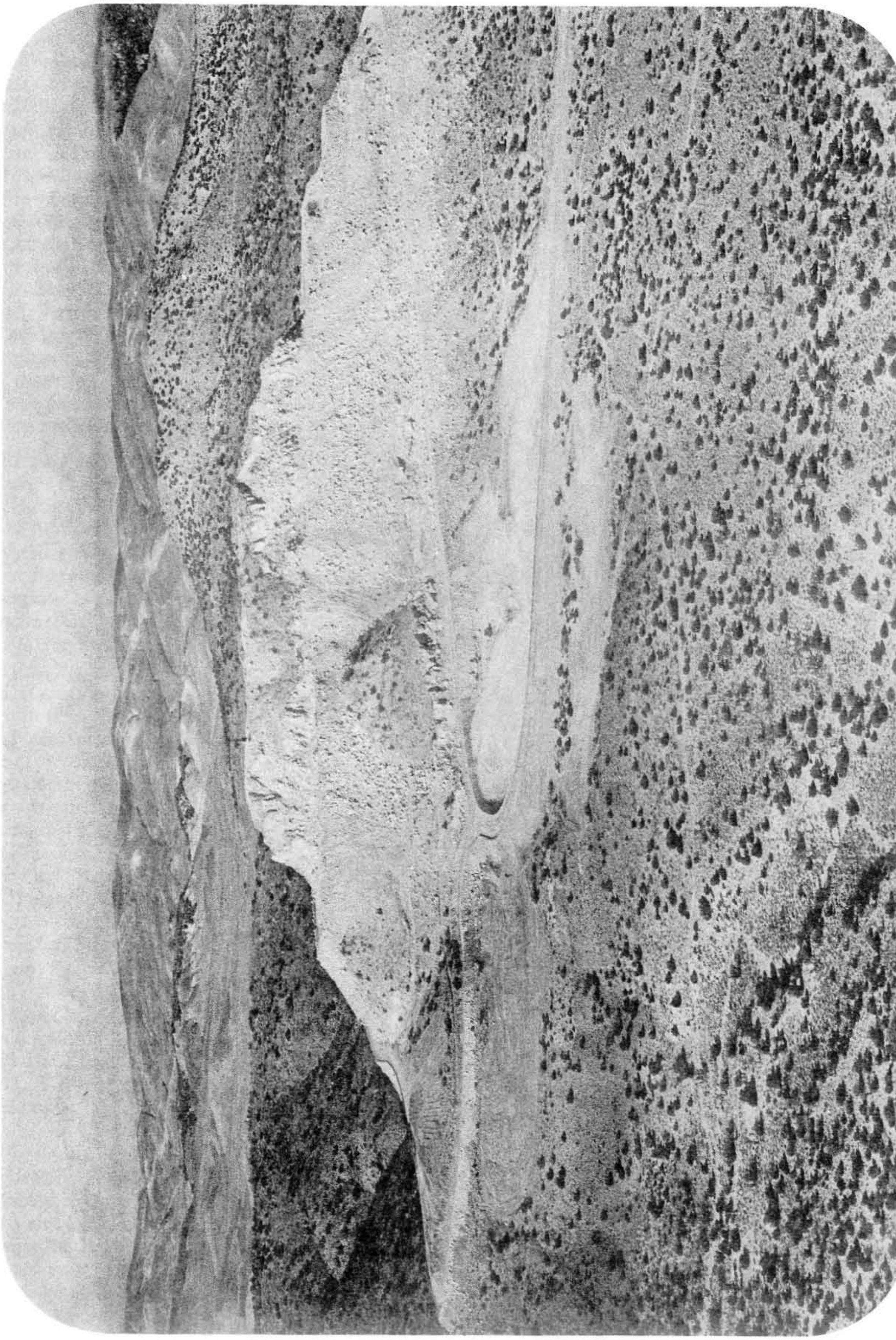


Figure 72. Aerial view to northwest of main limestone quarry (sec. 23 quarry) of California Portland Cement Company, Creal plant. Granitic rocks underlie flanks of prominent limestone mass. Pale hill in right background is limestone reserve in Secs. 14 and 15. *Photographed 1958 by United Aerial Survey, Tulare, courtesy California Portland Cement Company, Los Angeles.*

Figure 73. Aerial view to northeast of sec. 24 quarry, California Portland Cement Company's Creal plant. Limestone is obtained from pale rocks comprising main mass of hill; quartz mica schist and quartzite are obtained from darker rocks on left side of hill where one power shovel is stationed. *Photographed 1958 by United Aerial Survey, Tulare, courtesy California Portland Cement Company, Los Angeles.*

source of roofing granules. Other limestone-bearing pendants which trend north are present along the east side of Walker Pass Road east of Canebrake Creek, and northeast- to east-trending pendants are found south of Kelso Valley. In east-central Kern County limestone-bearing metamorphic rocks crop out from a point several miles south of Tehachapi Pass to the vicinity of Cinco and Cross Mountain. They are aligned along the northwest side of the Garlock fault and have not been mined for limestone. In the eastern part of the county a thick section of slightly metamorphosed Paleozoic sedimentary and volcanic rocks in El Paso Mountains was named the Garlock series by Dibblee (1952, p. 15, 19). A Paleozoic age, Permian in part, was assigned on the basis of faunal evidence. The Garlock series, unlike other Paleozoic sequences, contains little limestone and is composed mostly of shale, chert, and volcanic rocks. Hulin (1925) found a similar series to the east, in the vicinity of Randsburg, along the Garlock fault.

California Portland Cement Company (Creal) Deposits and Plant. Location: Secs. 13, 14, 15, 23, 24, 26, 27, T. 11 N., R. 14 W., S.B.M., and several adjoining sections astride Willow Springs Road and south of Oak Creek Road, 9 miles west of Mojave. The deposits are along the southeast margin of the Tehachapi Mountains. The plant is in section 24 and the main quarry is in section 23. Ownership: California Portland Cement Company, 612 South Flower Street, Los Angeles 17 (1959).

The Creal plant (fig. 71) of the California Portland Cement Company was built in 1954 and 1955 and placed in operation in December 1955. In 1958, most of the portland cement from it was marketed in the northern and western part of the Los Angeles area and the southern end of the San Joaquin Valley. Limestone for the plant is quarried from the large deposits that crop out discontinuously along the southern and eastern margins of the Tehachapi Mountains. In 1959 these deposits were being mined at the two initial quarries which were opened in sections 23 and 24, in the foothills about 1 mile west of the plant (figs. 72, 73). The company owns additional large reserves of limestone in sections 13, 14, 15, 26, and 27 east of the Willow Springs Road, and in section 27 west of the road.

The limestone is found with schist as roof pendants in Mesozoic granitic rocks. The metasedimentary rocks are part of the Bean Canyon series (Simpson, 1934, p. 381-383). These strata probably are of late Paleozoic or early Mesozoic age, but fossils have not been found in them.

The limestone, in the vicinity of the Creal plant, ranges from coarsely crystalline white and grayish white to finer-grained massive to banded, blue-gray to white. Some of it contains more than 54 percent CaO (table 12). The layers apparently differ in average grain size rather than in composition. The limestone is bordered by quartz monzonite and related granitic rocks and protrudes from these rocks in bold relief as strike ridges or as ovoid, isolated knobs. Granitic dikes penetrate the limestone

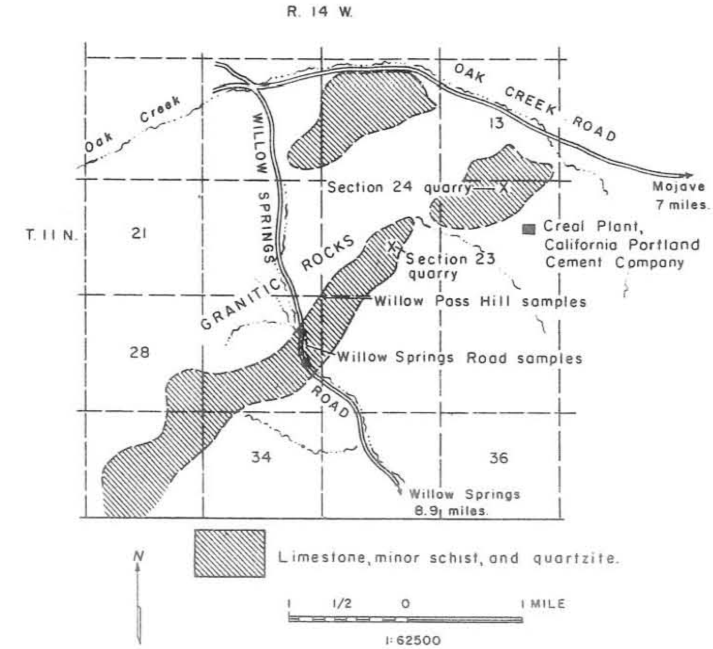


Figure 74. Geologic sketch of Willow Springs Rd.-Oak Creek Rd. area showing locations of limestone samples listed in Table 12.

bodies in many places and commonly the bodies are thoroughly shattered.

The limestone strata strike northeast and in most places dip 60°-80° SE. They underlie irregular ridges parallel to and 1 to 3 miles southeast of the Garlock fault. A limestone body in section 27 at Willow Springs Road, 1 mile southwest of the quarry in section 23, which was examined in detail, is 200 to 500 feet thick and thickens and thins abruptly between intrusive bodies. Individual limestone beds within it are from 2 to 20 feet thick. The arithmetical average computed from chemical analyses made by Abbot A. Hanks, Inc., San Francisco, on 13 clean samples of limestone collected by members of the Division of Mines in 1953-54 from this body along the Willow Springs Road (fig. 74) was as follows:

SiO_2	$Fe_2O_3 + Al_2O_3$	CaO	MgO	P_2O_5
0.48%	0.28%	53.53%	1.58%	0.02%

The magnesium oxide content ranged from 5.40 percent to 0.01 percent, and the calcium oxide from 54.65 percent to 49.31 percent (table 12).

Smaller limestone pendants are in an area about 2 miles north of the area sampled. The largest mass is in section 14, east of Willow Springs Road and south of Oak Creek Pass Road.

In 1958, limestone was being quarried from a ridge 400 feet high in the center of section 23 and from a lower, rounded, hill in sections 13 and 24 (fig. 73). The quarry in section 23 is about three-quarters of a mile southwest of the plant, and is the principal source of high-grade

limestone. The rock is hard, coarsely crystalline, and tends to break into angular blocks. In July 1958, the quarry (figs. 71, 72) was essentially an ovoid bench around the ridge top. The quarry in sections 13 and 24, about 1,000 feet northwest of the plant, contains shattered, medium-grained limestone and also is the source of the aluminous and siliceous fraction ("shale") from quartz-mica schist and quartzite strippings. This quarry (figs. 71, 73) has been benched on four levels and several pits at the south end are opened in schist. In addition to limestone, schist, and quartzite, the raw materials used at the plant include iron oxide (pyrite cinder) purchased from the Mountain Copper Company in northern California and gypsum purchased from the United States Gypsum Company in southern California. In December 1959, the plant utilized several truck loads of iron ore (hematite, magnetite) from the Monarch iron mine, located about 16 miles north of Trona in Inyo County.

In the quarries, blast-holes for development work are made with crawler-mounted wagon drills and most of the primary drilling is done with two crawler-mounted I.R. "down the hole" drills with 6½ inch bits. Loosened rock is loaded by 4½ cubic yard diesel electric shovels on 35-ton capacity rear-dump trucks which haul the limestone, schist, and quartzite to the primary crusher at the plant. The rock is selectively quarried and the various grades are delivered to the primary crusher in a sequence that provides raw rock to the plant in a rough chemical-grade blend.

The plant, which employs dry process, originally contained two rotary-kilns. Its initial rated capacity was 2,200,000 barrels per year, but expansion was begun in 1956 and by October 1958 the plant was reported to have a capacity greater than 6,000,000 barrels per year (Utley, 1958, p. 94) from five rotary kilns.

Quarry rock is delivered to the primary jaw crusher from which minus 10-inch rock is fed to a gyratory crusher. Minus 4-inch rock from the gyratory crusher is conveyed on a belt under a magnet for removal of tramp iron, then discharged to a vibrating scalper ahead of an impactor hammer mill. Rock from the hammer mill is conveyed to a vibrating screen from which the plus ¾-inch rock is recycled through the impactor and the minus ¾-inch from both scalper and screen is conveyed by a belt to the raw rock storage building. Dust is collected and returned in part to the circuit.

The rock and clinker storage building is divided into two sections. One end is for limestone, aluminous and siliceous rock ("shale"), and iron oxide and the other is for clinker and gypsum; all of these materials are stored in open-top feed-out bins. Continuous-type automatic weighing devices deliver predetermined quantities of limestone, "shale", and iron oxide for the raw grinding mills to one of two parallel belt conveyors in enclosed tunnels and also deliver clinker and gypsum to the second belt, which feeds the finish grinding mills.

The mill building houses 10 ball mills for raw and finish grinding. Raw material is ground to 90 percent minus 200 mesh and is then moved by screw conveyor and bucket elevator to one of the proportioning silos where the kiln feed is mixed to obtain the type of cement desired. From the proportioning silos the material goes to one of the kiln-feed silos where final blending is done and the material is fed to the 11- by 350-foot rotary kilns.

Clinker from the kilns is returned to the storage shed and together with gypsum is delivered to the finish grinding mills. Each mill grinds 125 barrels per hour at specified fineness. Finished cement goes to one of the 36 finished-cement storage silos which have a total capacity of about 400,000 barrels. The Creal plant makes several types of portland cement including Type I, Type II, and Type V. About 95 percent of the output is bulk loaded on railroad cars and trucks. The remainder is bagged.

Kennedy Minerals Company (Isabella Limestone Deposit, South Fork Valley) Deposit. Location: NE¼-NE¼ sec. 31, SW¼NW¼, N½SW¼ and SE¼SW¼ sec. 32, T. 26 S., R. 34 E., M.D.M., 6½ miles east of new Isabella and 1½ miles south of State Highway 178. Ownership: Kennedy Minerals Company, Inc., 2550 East Olympic Blvd., Los Angeles 23, owns two placer claims (Big and Small Piute claims) totaling 200 acres (1959).

The Piute claims were located in 1958 by the Kennedy Minerals Company who mapped and sampled the deposits. A small quarry was opened in the SW¼NW¼ section 32. By October 1958, the quarry face was about 16 feet high, and a few tens of tons of white limestone had been removed. Mining is done intermittently with a Caterpillar D-4 tractor equipped with a ripper and rock basket. Loosened rock is loaded on trucks for transport to the company's mill in Los Angeles where the limestone is ground and then sold as whiting for use in paint manufacture.

This deposit is in a belt, at least 10 miles long, of discontinuous limestone bodies described by Tucker (1929, p. 70) as the Isabella limestone deposit and listed by Logan (1947, p. 247) as South Fork Valley (deposit). The limestone deposit is surrounded by schist, quartzite, and granitic rock and is part of the Kernville series of Carboniferous (?) age (Miller and Webb, 1940). In plan the limestone body is irregular, about 1½ miles long, and ranges in width from 500 to 1,500 feet. It forms steep hills and ridges and some slightly rounded elongate hills. In general it strikes northwest and dips steeply southwest. In a few places the limestone is displaced several thousand feet along cross faults, and in most places the rock is thoroughly fractured.

High-calcium limestone in the quarry area is white, granular to coarsely crystalline, thick-bedded, and weathers buff to light gray. It contains a few thin beds of gray dolomite and a few small masses of chert. In the northwest part of the deposit (section 31), beyond the quarry area, the limestone is less pure and contains large masses of dolomite, quartzite, and impure calcareous materials. These contaminants apparently preclude the use of this

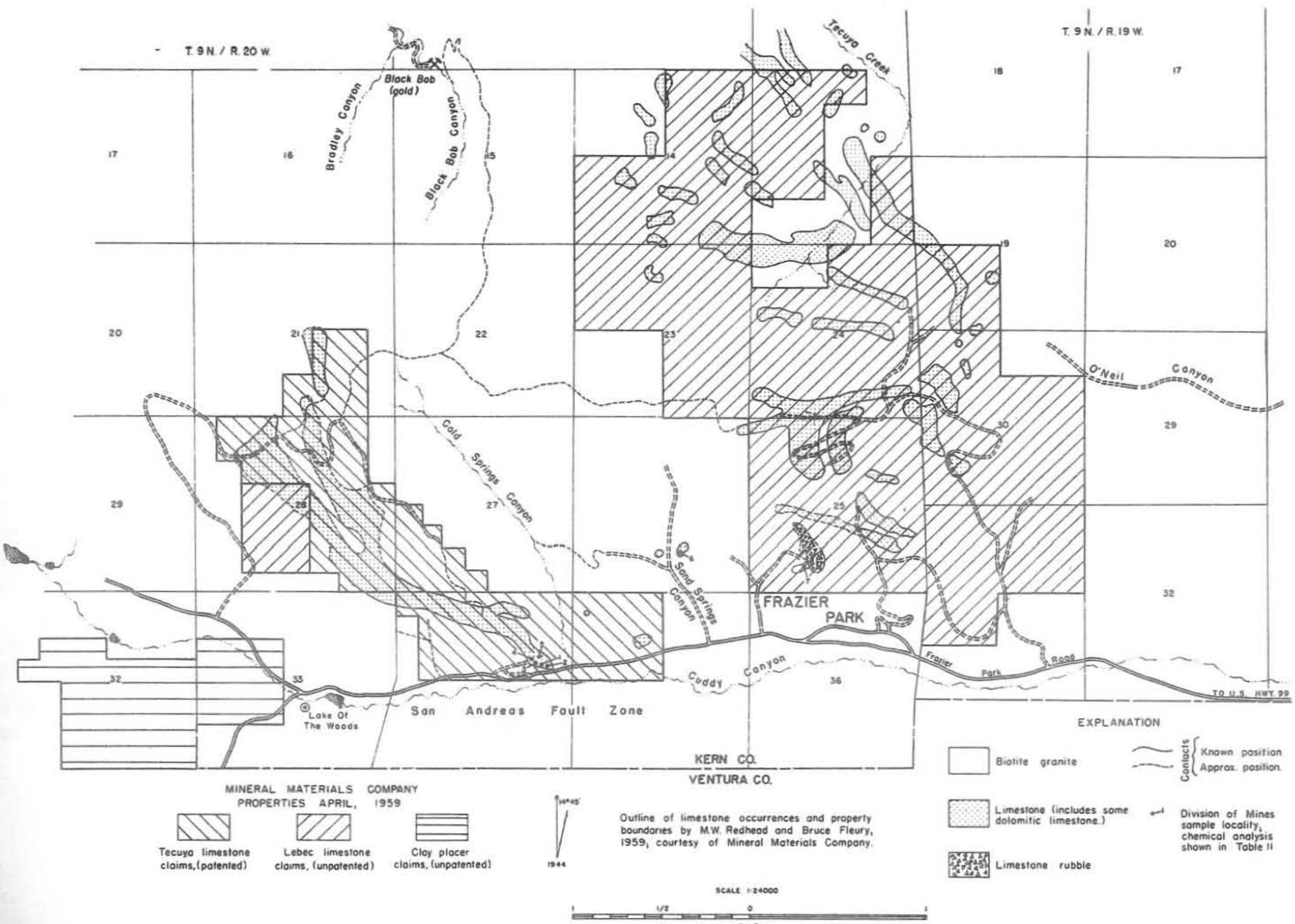


Figure 75. Reconnaissance geologic map of limestone masses near Frazier Park.

part of the deposit either as high-calcium limestone or industrial limestone.

The commercial limestone under development in October 1958 lies in the west half of section 32 and has a maximum thickness of about 400 feet, 300 feet of which is probably of commercial grade. Twenty-four samples collected and analyzed by the Kennedy Minerals Company averaged 51.68 percent calcium oxide and a 2.26 percent magnesium oxide. The calcium oxide content ranged from 43.00 percent to 54.82 percent and the magnesium oxide content ranged from 0.26 percent to 9.31 percent.

Lebec Deposit. Location: Secs. 13, 14, 23, 24, 25, T. 9 N., R. 20 W., and secs. 19, 30, 31, T. 9 N., R. 19 W., S.B.M., 4½ miles west of Lebec, north of Frazier Park. Ownership: Mineral Materials Co., a partnership consisting of Mr. C. W. Dunton and Mr. A. S. Vinnell, 1145 Westminster Ave., Alhambra, owns 26 unpatented placer claims (Lebec placer claims 1-26, totaling about 3,000 acres) (1959).

The Lebec deposit was located by the Mineral Materials Co. in 1956. The company has since explored the property by reconnaissance geologic mapping, sampled the limestone bodies and built access roads. No limestone had been marketed by March 1959.

Coarsely crystalline white to gray limestone is distributed in some 35 pendants in Mesozoic granite in an area of about 5 square miles astride a prominent west-trending ridge (fig. 75). Several of the larger pendants are each 1 mile or more in length and range from 300 to more than 1,000 feet in width. Many of the smaller pendants are at least a quarter of a mile long and 200 to 500 feet wide. In general the limestone bodies strike northwest and dip steeply southwest. Thirty-five surface samples, collected by the Mineral Materials Co. from 26 pendants and analyzed by. Eisenhauer Laboratories, Los Angeles, averaged 54.00 percent calcium oxide and 0.45 percent magnesium oxide. The calcium oxide content ranged from 42.29 percent to 55.85 percent and the magnesium oxide content ranged from 0.04 percent to

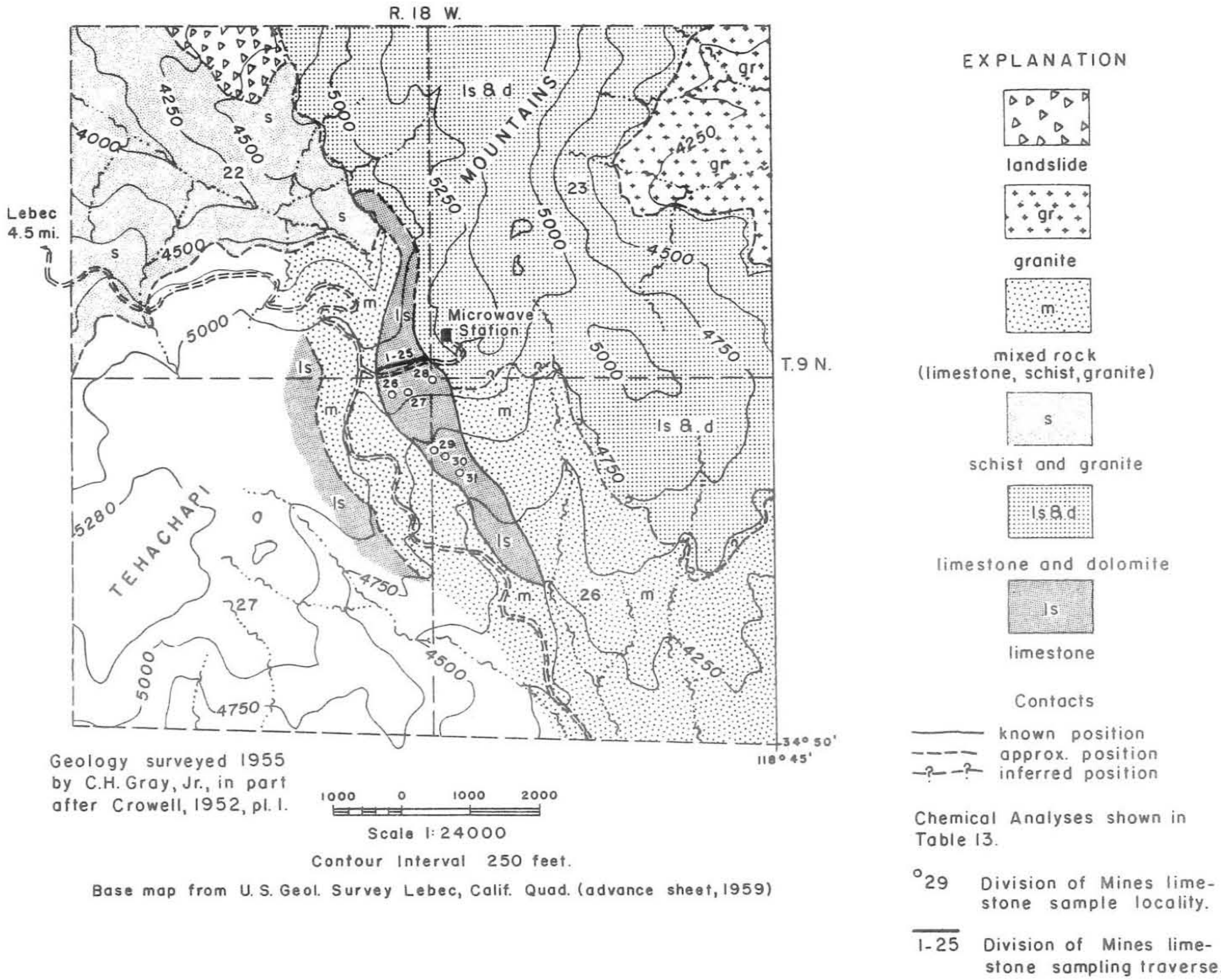


Figure 76. Geologic sketch of Microwave Station area.

4.35 percent. The silicon dioxide content averaged 1.65 percent and ranged from 0.16 percent to 14.35 percent.

Reserves have not been measured by drilling (October 1959) but the owner estimates indicated reserves of about 20,300,000 tons and inferred reserves of about 30,500,000 additional tons in the southern and lower parts of the area more readily accessible from the Frazier Park Road. Even larger reserves are estimated by the owner in the higher areas and in an area farther north in the vicinity of Tecuya Creek on the north side of the ridge.

Microwave Station Deposits. Location: SE¼ sec. 22, SW cor. sec. 23, NW¼ sec. 26, NE¼ sec. 27 (proj.), T. 9 N., R. 18 W., S.B.M., 5½ miles northeast of Lebec, south of Bear Trap Canyon and east of Oso Canyon, in the southwestern Tehachapi Mountains. Ownership: Undetermined (1958).

Paleozoic (?) limestone crops out over about 7 square miles in the northeast one-quarter of the Lebec quadrangle (Crowell, 1952), and extends eastward into the southwest one-quarter of the Neenach quadrangle (Wiese, 1950). Much of the limestone is impure and contains abundant oxides of iron, magnesium, and silicon. In many places the limestone contains layers of schist and hornfels and bodies of granite so that the limestone is present only as small bodies irregularly exposed above the less resistant rocks. Nevertheless, lenses of high-calcium limestone (fig. 76), as much as 1,000 feet wide and 1 mile long, are in the limestone area shown by Crowell (1952, pl. 1).

The largest known body of high-calcium limestone crops out 500 feet west of a microwave station southeast of Bear Trap Canyon. This lens (fig. 76) is about 1¼ miles long. It is about 1,000 feet wide at its central part, thins to about 300 feet to the north, and to 450 feet to the south. Bedding is not apparent but in plan the lens trends northwest. It consists of white and gray mottled to blue-gray, fine- to coarse-grained crystalline limestone. The northern part of this high-calcium limestone body is bordered on the east by a reddish-buff dolomitic limestone. Mixed limestone, granite, and schist borders it on the west, south, and southeast, and to the northwest it grades into dolomitic limestone.

In 1955, the Division of Mines collected 31 clean samples from the high-calcium limestone lens noted above. Twenty-five samples were taken at 40-foot intervals along the Microwave Station road, approximately perpendicular to the long axis of the lens. Three random samples were collected along an old road 100 feet south of the Microwave Station road, and 3 samples were collected to the southeast at intervals of about 300 feet parallel to the long axis of the lens and from its central part (fig. 76). The samples were chemically analyzed by Abbot A. Hanks, Inc., San Francisco. The arithmetical average of the 31 samples was as follows:

Silica	*Ferric oxide*	*Alumina*	*Calcium oxide*	*Magnesium oxide*	*Phosphorus pentoxide*
0.602%	0.080%	0.296%	53.17%	1.75%	0.015%

The magnesium oxide content ranged from 0.76 percent to 12.42 percent and the calcium oxide from 41.14 percent to 54.69 percent (see table 13). The high-magnesium limestone is apparently confined to two zones, one 320 to 360 feet from the east edge of the high-calcium body, and the other along the west margin. These analyses indicate that the area is a potential source of high-calcium limestone.

Monolith Portland Cement Company (Los Angeles Aqueduct Plant) Deposits and Plant. Location: secs. 12, 13, 14, 24, T. 32 S., R. 33 E., M.D.M.; secs. 7, 19, 20, 30, T. 32 S., R. 34 E., M.D.M., and a large tract of adjoining land; 4 miles east of Tehachapi at Monolith Station along the southern margin of the Sierra Nevada. The plant is in sec. 30, T. 32 S., R. 34 E., M.D.M., adjacent to the Southern Pacific and Santa Fe Railroads, and the quarries are in secs. 13, 14, T. 32 S., R. 33 E., M.D.M., about 2 miles from the plant. Ownership: Monolith Portland Cement Company, Box 65947 Glassell Station, Los Angeles 65. Part of the holdings are leased from the J. W. Jameson Corporation, 541 South Spring Street, Los Angeles (1959).

The cement plant at Monolith (fig. 77) has been operated continuously since 1909, except for a period of several years preceding 1921. In 1909, the City of Los Angeles built the plant, known then as the Los Angeles Aqueduct Plant, to manufacture portland cement for use in constructing an aqueduct between Haiwee Reservoir and Los Angeles. The original plant had a daily capacity of 1,200 barrels of portland cement. More than 900,000 barrels of cement was produced by the city under the brand name of "Monolith." The City owned three lime-

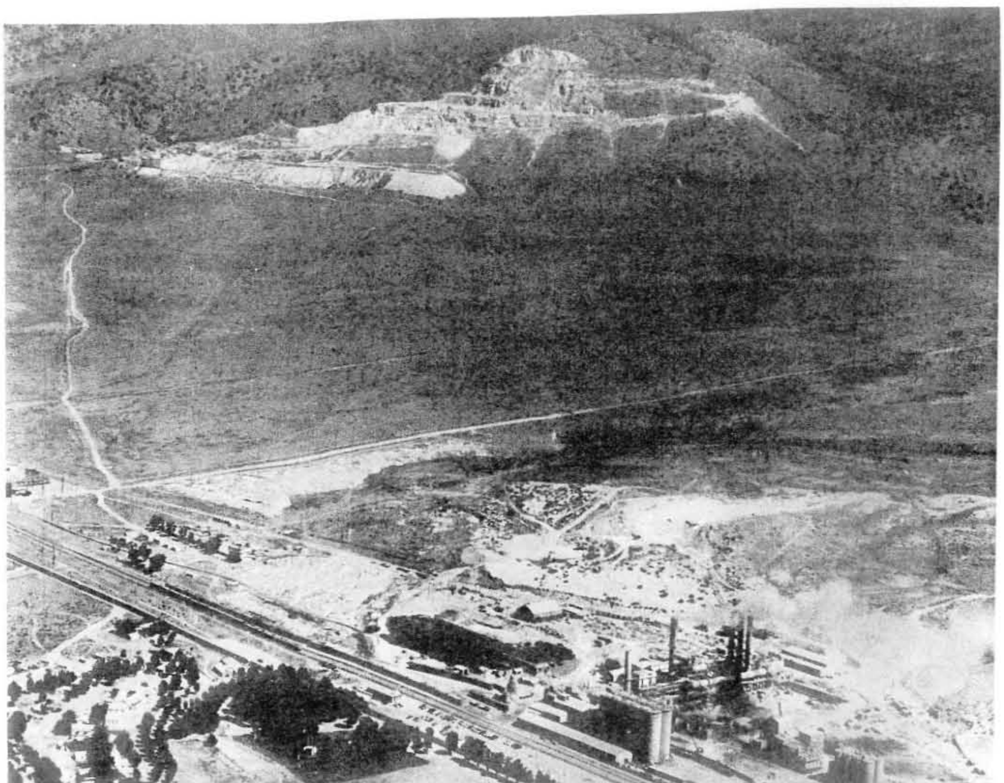


Figure 77. Aerial view to northwest of Monolith Portland Cement Company plant, near Tehachapi. Limestone quarry is in background; tuff quarry for pozzolanic material is adjacent to plant. *Photograph, 1958, courtesy Monolith Portland Cement Company, Los Angeles.*

stone deposits—(1) the "Cuddeback Ledge" and (2) the "North quarry", both several miles northwest of the plant and apparently in the vicinity of the area being quarried in 1958, and (3) the "South quarry", 6 miles southwest of the plant (see Los Angeles Aqueduct South quarry in tabulated list). The South quarry was opened first. An aerial tramway 4,700 feet long was installed to deliver limestone from the quarry to a bin near the north base of the hill. The rock was transported on a narrow gauge railroad 5¼ miles to the plant. In 1912, the Cuddeback quarry was opened and a narrow gauge railroad built to the plant.

Clay was obtained from the bed of a periodically drained shallow playa lake north of the plant and the clay was transported to the plant by a horizontal aerial tramway 5,800 feet long.

Altered rhyolitic tuff, large deposits of which crop out just north of the plant (fig. 77) was utilized to a limited extent to manufacture pozzolanic material at the plant. However, most of the raw material for making pozzolan was obtained from volcanic "tufa" deposits (altered acidic tuff) at Haiwee and Fairmont, in Inyo County. Regrinding plants were built there to blend the volcanic rock with portland cement, producing what was called "Tufa Cement." According to Drury (1954, p. 1) this product, used in the Los Angeles Aqueduct during 1910-12, was the first substantial quantity of portland-pozzolan cement used in the United States.

In 1921, the Los Angeles Aqueduct Plant was purchased by Monolith Portland Cement Company and reactivated. The daily capacity was quickly increased to 3,000 barrels, and since World War II the plant, which employs the wet process, has been extensively rebuilt. In 1958 it contained five kilns and had a rated capacity of about 4,745,000 barrels per year or 13,000 barrels per day.

The limestone mass being quarried in 1958 by the Monolith Portland Cement Company lies in the SW¼ sec. 13, and the SE¼ sec. 14, T. 32 S., R. 33 E., M.D.M., 2 miles northwest of the plant (fig. 77). The main quarry, known as the Jameson quarry, lies about equally in the SE¼ sec. 14 and SW¼ sec. 13. Smaller and as yet unworked deposits are in the NE¼ sec. 14 and the NW¼ sec. 13. The limestone at the Jameson quarry is in a carbonate layer that forms part of a northeast-trending southeast-dipping homoclinal sequence of metamorphic rocks. The carbonate layer is estimated to be about 800 feet thick and is underlain by a layer of quartzite and quartz-mica schist more than 500 feet thick.

These metamorphic strata are not yet correlated but probably are late Paleozoic or early Mesozoic in age, although fossils have not been found in them. They may be correlative to the Bean Canyon series described by Simpson (1934) or with the Kernville series of Miller and Webb (1940). It is possible that these units are all equivalent or partly equivalent in age.

The northwest contact between the limestone and the underlying quartzite, which reflects the attitude of the beds, typically strikes N. 30° E. and dips 20°-30° SE. The dip of the bottom surface of the limestone mass, which is not everywhere parallel to the bedding within the mass, steepens somewhat toward the south end. The strike of the beds appears to swing noticeably to the east at the north end of the deposit. The main limestone body is about 3,500 feet long and averages 2,500 feet in width. It underlies about a quarter of a square mile, is roughly triangular in plan with the base to the southeast and apex to the northwest, and is thickest at the south end and thinnest at the north end. The lower two-fifths of the limestone layer is more fractured, more extensively intruded by dikes and sills, and thinner-bedded than the upper three-fifths, which, therefore, contains the best limestone.

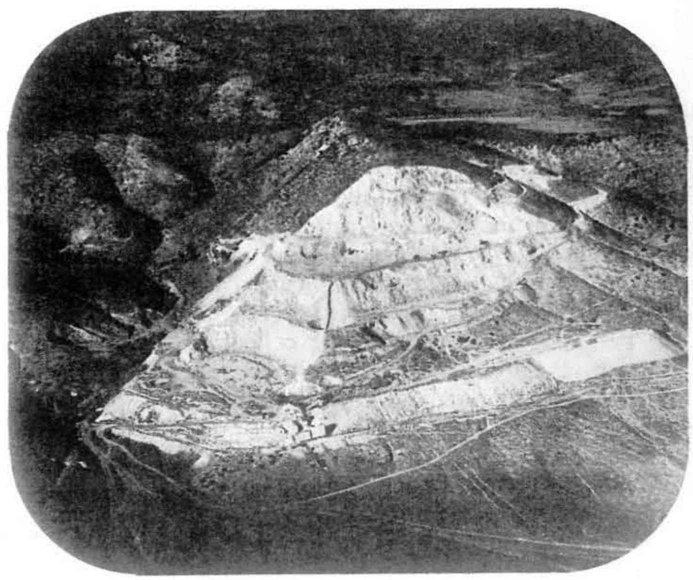


Figure 78. Aerial view to northeast of Monolith Portland Cement Company limestone quarry. Primary crusher and storage bins are at lower left part of hill. Quartzite and quartz mica schist are occasionally obtained from small quarries left of the limestone quarry. *Photography, 1958, courtesy Monolith Portland Cement Company, Los Angeles.*

The limestone is coarse to extremely coarse grained, ranges from blue-gray to glassy white, and contains graphite flakes. Bedding and fracture surfaces throughout the limestone body are commonly coated with red iron oxide stains left from downward-percolating groundwaters. In the quarry, rock exposed at all levels shows this feature. Company representatives stated that select rock ranges from 94 percent $CaCO_3$ to 98 percent $CaCO_3$ and that quarry-run rock supplying the Monolith plant averages 85.2 percent $CaCO_3$. The principal contaminants in the quarried rock are (1) decomposed granite from dikes, sills, and irregular intrusive masses; (2) aluminous and lime-aluminum silicate minerals of contact metamorphic origin and related to the granitic rocks; and (3) soil particles washed into cavities in the limestone from the surface or blown into the quarry by wind. The granitic

dikes are accompanied by quartz veins, mostly only a few inches wide, which are widely distributed through the limestone.

Total reserves in the main limestone mass are conservatively estimated at 80,000,000 tons, allowing for a 15 percent volume of granite and a weight of 150 pounds per cubic foot for the limestone in place (personal communication O. E. Bowen, Jr., September, 1957).

In addition to the limestone and a small amount of decomposed granitic rock obtained at the main quarry, six other mineral raw materials are utilized. Alluvium, to provide silica, alumina, and some iron, is mined by power shovel from shallow surface workings 2 to 3 miles north of the plant (SW¼ sec. 7, T. 32 S., R. 34 E., and SE¼ sec. 12, T. 32 S., R. 33 E., M.D.M.) and transported to the plant on a narrow gauge railroad (see Tehachapi Lake Clay in tabulated list in *Clay* section). Gypsum, used as a retarder, is obtained from the Company's mines in Quatal Canyon in the northwestern corner of Ventura County and transported about 60 miles to Monolith by railroad. Iron oxide (pyrite cinder) is purchased from the Mountain Copper Company in northern California. Altered acidic tuff from the Kinnick formation of Miocene age (Buwalda, 1954, p. 134) for pozzolanic material is obtained just north of the plant. Quartzite and quartz-mica schist are obtained occasionally from a quarry in the SW¼ sec. 14, T. 32 S., R. 33 E., M.D.M., west of the main limestone quarry. During 1958, quartzite was mined from a newly opened small quarry near the center of section 14.

The principal limestone quarry (Jameson quarry, SE¼ sec. 14, SW¼ sec. 13, T. 32 S., R. 33 E., M.D.M.) 2 miles northwest of the plant, contains five main bench levels (figs. 78, 79). Primary crushing by jaw crusher, hammer mill, and ball mill is done at the south edge of the quarry to obtain minus ½-inch material. It is hauled on narrow gauge rail to storage facilities at the plant. From raw storage a clamshell-equipped crane transfers the material for secondary raw grinding by three large ball mills and then five tube mills. During secondary grinding the material is made into a slurry which is pumped to blending silos in which chemical control is maintained.

The slurry is then transferred to storage tanks where it is agitated by paddles and air before being fed into rotary kilns. Cement clinker is made in three small rotary kilns with average dimensions of 8.85 by 238 feet and two large rotary kilns, one with average dimensions of 11.03 feet by 388 feet and the other 12.95 feet by 558 feet. Clinker from the kilns goes to storage by belt conveyor. Gypsum is added to the clinker and finish-grinding is done in ball and tube mills.

Air separation and dust collection are employed for particle-size grading of the ground cement. Screw conveyors transport the finished material through part of the plant circuit, and blowers feed the finished cement into storage silos. The company makes several types of portland cement including Type I, Type II, Type III (high-early-strength), block cement, low alkali, pozzolanic, and plastic water proof. The finished cement is marketed in bulk and in bags.

Figure 79. View to north of Monolith Portland Cement Company, July 1958. Rocks around lower parts of limestone mass are quartz mica schist and granitic rocks. Main quarry level is about halfway up the hillslope.

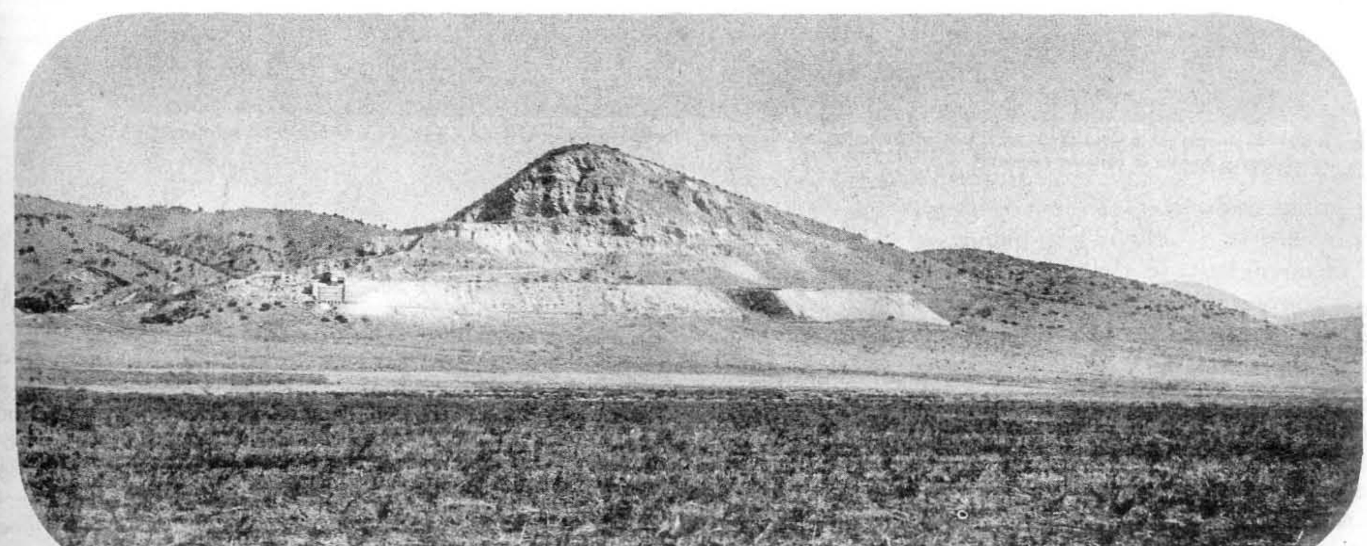


Figure 80. Remnants of a four-stack lime kiln of Summit Lime Company, east side of Antelope Canyon, July 1958. Rock obtained from main quarry above was delivered to kiln in inclined tramways.

Summit Lime Company (Union Lime Company) Deposit. Location: secs. 34 and 35, T. 12 N., R. 15 W., S.B.M., and adjoining land along Antelope Canyon in the northern foothills of the Tehachapi Mountains, 3 miles due south of Tehachapi. Ownership: Summit Lime Company, c/o Elliott S. Wyman, president, 2130 Workham Way, Sacramento, owns 1720 acres (1959).

From the late 1880s to 1928, limestone for use in lime burning was quarried from the Summit Lime Company deposit. The original operator, the Summit Lime Company, later leased its holdings to the Union Lime Company who operated as many as eight kilns, four in Antelope Canyon below the quarry (fig. 80), and four in Tehachapi. The Union Lime Company was the largest lime producer in the county. In 1914 the eight kilns had a total capacity of 560 barrels of lime per day and 50 men were employed to operate them and the limestone quarries (Brown, 1916, p. 518-519). The lime was marketed in southern California and Arizona under the name "Blue Summit Lime". Most of the limestone was quarried in the SW¼ sec. 35 on the east side of Antelope Canyon (fig. 81). A quarry at the north edge of section 2, T. 11 N., R. 15 W., S.B.M., about a quarter of a mile to the southeast, was operated by the City of Los Angeles

from 1909 to about 1912 to supply their cement plant at Monolith (see Los Angeles Aqueduct South quarry in tabulated list).

The quarries are in a belt of pre-Cretaceous metasedimentary rocks. In the section 35 quarry these metamorphic rocks strike N. 20°-30° W., they dip 60°-65° NE. at the south end of the quarry and 60°-65° SW. at the north end. The limestone in the quarries is white to blue-gray, fine- to coarse-grained, and contains flakes of graphite and cubes of red-brown iron oxide. The limestone beds are intimately interlayered with quartz-mica schist and the deposit is riddled by both light and dark granitic bodies. Most of the carbonate rock appears to be high-grade limestone, but some is dolomitic. The limestone and schist exposed in the quarry face are tightly folded. Tucker (1929, p. 72) reports the main mass of interbedded limestone and schist is about 4,000 feet long and 500 feet thick, and that the limestone was stated to average 98.5 percent $CaCO_3$ and 2 percent SiO_2.

Three principal quarries and at least a dozen smaller quarries were worked, apparently to select the best material. The largest and uppermost quarry is about 300 feet long and the face is about 300 feet high. It was worked on several levels. After blasting, broken material from the quarry was delivered to the kilns in the canyon below along a system of inclined tramways. The last reported lime production was in 1928. In 1940-43 the property yielded a few hundred pounds of tungsten ore (see BCM mines in tabulated list under *Tungsten*).

Some coarse-grained white and blue-gray limestone for specialty rock apparently can yet be obtained from this deposit. The schist layers and granitic bodies, however, would require selective mining of the limestone and the deposit as exposed in the quarry face is probably not sufficient for a large operation.

Figure 81. View to southeast of main quarry, Summit Lime Company, July 1958. Pale limestone is interlayered with schist and intruded by granitic rocks. Layers of schist in upper center of quarry are contorted.

Tecuya (Cuddy Canyon, Kramer) Deposit. Location: secs. 21, 27, 28, 34, 35, (proj.) T. 9 N., R. 20 W., S.B.M., 1½ miles west of Frazier Park on the north side of Cuddy Canyon. Ownership: Mineral Materials Co., a partnership consisting of Mr. C. W. Dunton and Mr. A. S. Vinnell, 1145 Westminster Ave., Alhambra, owns eight patented placer claims (Tecuya 1-8) totaling about 1,200 acres, and one unpatented placer claim (Lebec No. 27) (1959).

The Tecuya deposit (fig. 75) was located by W. Scott Russell and associates in 1948 and patented in 1950. It apparently is the same as the earlier known Kramer limestone deposit (Tucker, 1924, p. 191) and also the Cuddy Canyon limestone deposit (Tucker, 1929, p. 70). According to Logan (1947, p. 246) no work had been done on the property by the mid 1940s. A small quarry was opened in 1949 at the eastern end of the deposit and is said to have yielded several tons of test stone for sugar refining.

In 1956, the property was purchased by the Mineral Materials Co. who since then have mapped and sampled the limestone body, and constructed well-graded truck roads. During October-December 1958 approximately 100,000 tons of limestone was quarried from the east end of the deposit and stockpiled. This included 10,000 tons of 1½-inch by 6-inch coarse-grained white limestone which was stockpiled separately for the future production of roofing granules and industrial limestone. Another stockpile consisted of 5,000 tons of minus 1½-inch rock. Late in 1958 crushing and screening equipment, belt conveyors, storage bins, and truck-loading facilities were installed. In May 1959, this plant (fig. 82) was processing and bagging roofing granules with Mr. Ted Heins, Industrial Mining and Milling Company, Barstow, as operator.

Crystalline limestone bodies are present as roof pendants (fig. 75) in Mesozoic biotite granite along the Ventura-Kern County line west of U. S. Highway 99. The Tecuya deposit, one of the largest and most accessible of these pendants, is on the north side of Cuddy Canyon, 5½ miles from U. S. Highway 99. The Frazier Park highway passes through the southeastern end of this pendant which is exposed in a roadcut near the canyon bottom and extends northwest out of the canyon to beyond Cuddy Lookout, 2,000 feet above the canyon floor. The limestone is terminated on the south by the San Andreas fault, the trace of which coincides with Cuddy Canyon.

The pendant that contains the limestone and associated quartz-biotite schist strikes northwest and dips 40° NE. In most places the limestone-granite contact is clearly defined but is offset along several small faults. The principal limestone body is about 2 miles long and ranges from 200 to 1,300 feet in width, but schist is interbedded with the limestone, particularly in the lower part of the

sequence. In the northwestern part of the pendant, near Cuddy Peak, the limestone body appears to split into two main fingers, separated by schist and granite.

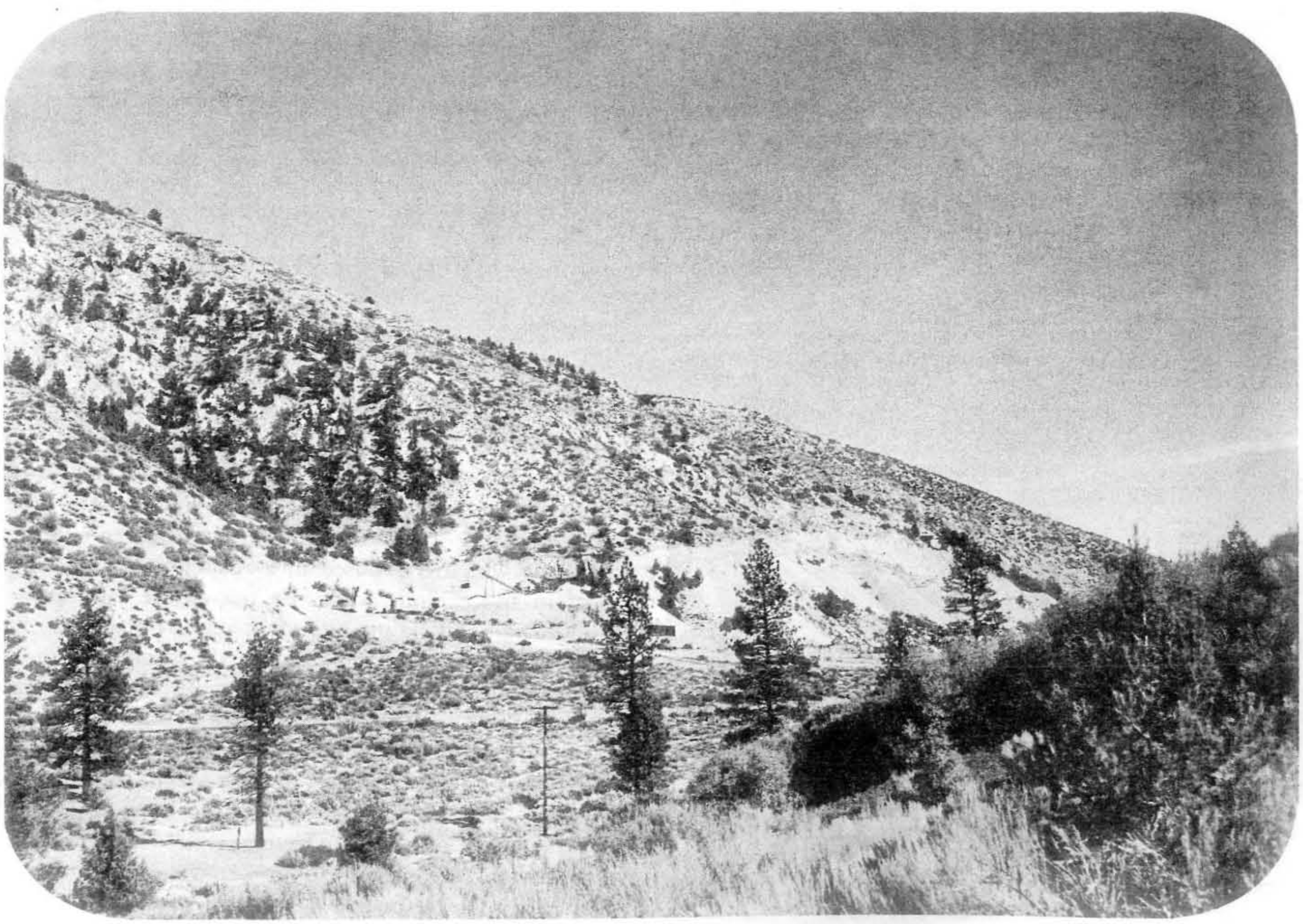
The limestone is poorly bedded, white to gray, coarsely crystalline, and has a distinct odor of hydrogen sulfide when broken. In places it is iron stained and contains epidote and small flakes of graphite.

Thirteen composite samples collected from the surface across the central part of the main deposit between the highway and Cuddy Peak by the Mineral Materials Co., and analyzed by Eisenhauer Laboratories, Los Angeles, averaged 50.09 percent calcium oxide and 1.32 percent magnesium oxide. The calcium oxide ranged from 46.90 percent to 55.33 percent and the magnesium oxide ranged from 0.04 percent to 2.78 percent. Nine samples from small pendants and the margins of the main deposit also were collected by the Mineral Materials Co. and analyzed by Eisenhauer Laboratories. These samples averaged 43.98 percent calcium oxide and 4.20 percent magnesium oxide. The calcium oxide ranged from 28.67 percent to 50.47 percent and the magnesium oxide ranged from 1.23 percent to 8.81 percent. Six samples, four from the main deposit and two from its margins, were analyzed for silicon dioxide which ranged from 1.20 percent to 6.60 percent and averaged 3.24 percent. Five samples were collected during 1955 by Division of Mines personnel from the southeastern end of the outcrop in the vicinity of the present quarry. Chemical analyses of these samples are listed in table 11.

Reserves have not been measured by drilling (October 1959) but the owner estimates that the lower and eastern part of the deposit contains indicated reserves of about 40,000,000 tons and inferred reserves of about 60,000,000 additional tons. Additional potential reserves in the higher northwest part of the deposit were estimated by the owner to be 65,600,000 tons.

The quarry at the southeastern end of the deposit is worked from a narrow road-like bench level.

Figure 82. View to northeast of Tecuyá limestone deposit, west of Frazier Park. Limestone forms most of pale outcrops; darker rocks are quartz mica schist and granitic rocks. Small quarry at right is at southeast end of limestone deposit; limestone is crushed and screened for roofing granules in plant in left middleground. *Photograph, January 1958, by George B. Cleveland.*



LIMESTONE, DOLOMITE, AND CEMENT
(CEMENT)

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
413	California Portland Cement Company, Creal plant and deposits	Secs. 13, 14, 15, 16, 17, 19, 20, 23, 24, 25, 26, 27, 35, T11N, R14W, SBM, and secs. 24, 25, T11N, R15W, SBM, astride Willow Springs Rd. and south of Oak Cr. Rd. 9 miles west of Mojave	California Portland Cement Company, 612 South Flower Street, Los Angeles 17 (1958)	Gray and white, medium to coarse grained pre-Cretaceous crystalline limestone strikes NE. and dips steeply NW. to SE. Limestone stands out from surrounding granitic rock in bold strike ridges.	See text. Five-kiln dry-process plant located in sec. 24, T. 11 N., R. 14 W., S.B.M. Plant placed in operation in 1956; reported in 1958 to have annual capacity greater than 6,000,000 barrels. Main limestone quarry developed in central part of sec. 23, T.11 N., R. 14 W., S.B.M. (Lenhart 56:78-83; Utley 56:75, 78; 58:92-95).
	Creal plant and deposits				See California Portland Cement Co.
	Los Angeles Aqueduct plant and deposits				See Monolith Portland Cement Company.
414	Monolith Portland Cement Company plant and deposits	Secs. 12, 13, 14, 24, T32S, R33E, MDM, secs. 7, 19, 20, 30, T32S, R34E, MDM, and a large tract of adjoining land	Monolith Portland Cement Company, P.O. Box 65947 Glassell Station, Los Angeles 65 (1958). Part of the holdings are leased from the J. W. Jameson Corporation, 541 South Spring Street Los Angeles	Blue-gray to glassy-white coarse grained crystalline pre-Cretaceous limestone, underlain by quartzite and mica schist, crops out in the SE¼ and NW¼ of sec. 14 and in the SW¼ of sec. 13. The limestone strikes NE. and dips SW.	See text. Five-kiln wet-process plant located in secs. 19, 30, T. 32S., R. 34 E., M.D.M. Plant built in 1909 by City of Los Angeles; reported in 1958 to have annual capacity of 4,745,000 barrels. Main limestone quarry lies in SE¼ sec. 14, T. 32 S., R. 33 E., M.D.M. The Jameson Lime Company (later Blue Diamond Company) quarried limestone from this vicinity for use in lime burning during the first quarter of the century. (Aubury 04:19t; 06:70-71; Board of Public Service Commissioners of the City of Los Angeles 16:98-110; Brown 16:478-479, 516-518; Haley 22:51, 60; Logan 47:246-247; Symons 28:261; Tucker 21:307; 29:70-72; Tucker, Sampson, Oakeshott 49:244-245, 279t; Ver Planck 52:53, 56, 141t).

LIMESTONE, DOLOMITE, AND CEMENT
(DOLOMITE)

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Last Chance Mine				See Star Dolomite deposit.
415	Marble Spring Canyon deposit	Center sec. 34, T10N, R17W, SBM, 9 miles northwest of Antelope Aqueduct Station in Marble Spring Cyn., south of Bear Trap Cyn.	Undetermined, 1958	Fine-grained, hard, white dolomite crops out as several small knobs in granitic rock. Much of the dolomite is red or pinkish-brown mottled; shows red iron stains and contains notable silica.	See table in text for analysis. Deposit has not been worked but probably could furnish several tens of thousands of tons of white, sugary dolomite. Location is remote.
	Mountain Minerals dolomite deposit				See Star Dolomite deposit.
416	Star Dolomite (Mountain Minerals dolomite deposit, Last Chance mine) deposit	W½ cor. sec. 15(?), T9N., R22W, SBM, (proj.); North side of County Rd. 16 miles west of Frazier Park, ½ mile east of Toad Spr.	E. N. Bramwell and Oatis Turk, Route 1, Box 261, Taft, 1959; Vetta V. Bartholemew, c/o McCarty Brothers, Taft (1934)	White, fine-grained crystalline dolomite. One of an undetermined number of pre-Cretaceous carbonate bodies that occur on the northeast side of the San Andreas fault in the vicinity of Blue Ridge, midway between Cuddy Valley and Maricopa.	Several hundred tons of white dolomite was mined in 1956-1957 (?) and marketed as roofing granules in the Bakersfield area by Frank Bush. Present owners have installed a processing plant which includes primary and secondary crushers, screens, and storage bins. By Sept. 1, 1959, no material had been marketed. (Logan 47:247).
417	White Ridge deposit	SW¼ sec. 25, T9N, R20W, SBM, on the southwest side of a northwest-trending ridge, half a mile north of Frazier Park	Undetermined, 1958; Florence Cuddy, Frazier Park (1949)	Masses of brecciated, coarse-grained crystalline white dolomite intercalated with non-calcareous fine-grained metasedimentary rocks of pre-Cretaceous age. Principal dolomite mass exposed over an area about 200 feet long and 50 to 100 feet wide.	Developed by two small cuts, one above the other, each about 50 feet long and 20 feet high. Said to have yielded a few tons of poultry grit. See table in text for analysis. Idle 1958. (Tucker, Sampson, Oakeshott 49:278t).

LIMESTONE, DOLOMITE, AND CEMENT
(LIMESTONE)

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
418	Bean Canyon area deposits	Secs. 5, 6, 7, T10N, R14W, SBM, (proj.) about 5 miles northwest of Willow Springs Pumping Station, in the southeastern foothills of the Tehachapi Mts.	Undetermined, 1958	Gray and white, banded pre-Cretaceous crystalline limestone strikes N. 30° E., dips steeply NW. Part of the "Bean Canyon Series" described by Simpson (1934). In Bean Cyn., carbonate rocks are minor and the series is chiefly well-bedded quartzite and schist. Larger bodies of limestone crop out along the major drainage 1 mile southwest of the cyn. Here the limestone is much intruded by granitic rocks and only caps the ridge top. The limestone contains siliceous pods and dolomite. Two random samples from the middle lens averaged 52.57 percent CaO and 1.49 percent MgO.	Has not been worked. See table in text for chemical analyses. (Simpson 34: pl. 5).
	Blue Diamond deposit				See Jameson.
419	Calcite placer No. 1 deposit	SE¼ sec. 12, T10N, R15W., SBM, on the east flank of the ridge ½ mile east of Gamble Spring Cyn. on the southeast flank of the Tehachapi Mts. 5 miles north-northeast of West Antelope Aqueduct Sta.	Undetermined, 1958; Robert B. Henderson (1925)	Gray and white crystalline banded limestone of the Triassic-Jurassic (?) "Bean Canyon Series." Limestone strikes NE., dips steeply NW. and contains a few thin streaks of dolomite. The limestone is interleaved with quartz monzonite.	One 160-acre patented placer claim, patent No. 961221. No known production. Idle 1958.
420	Cowell deposit	SE¼NW¼ sec. 23, T32S, R33E, MDM, 2 miles east of Tehachapi, north of railroad	Henry Cowell Lime and Cement Company, c/o Henry Cowell Trust Estate, 2 Market Street, San Francisco (1959)	Blue-gray to white coarse-grained crystalline pre-Cretaceous limestone underlain by quartzite and mica schist crops out in the west half of sec. 23.	Developed by several small quarries. Foundation of a lime kiln remains in the NE¼NW¼ sec. 23. May be part of the long inactive Jameson Lime Company operation, which see. Idle 1958.
	Cuddy Canyon deposit				See Tecuya.
421	Dark Canyon deposits	Sec. 30, T30S, R35E, MDM, and N½SE¼, SW¼NE¼, NE¼SW¼ sec. 24, T30S, R34E, MDM, 11 miles east of Loraine at the head of Back Cyn.	Jess E. Hicks and associates, 7657 Seville Ave., Huntington Park (1958)	White to light gray, fine-to coarse -grained pre-Cretaceous crystalline limestone crops out in several large bodies on both sides of Back Cyn. The limestone contains quartz veins, dolomite zones and graphite flakes and is underlain by granitic rocks and mica schist. In places the limestone is intruded by granitic rocks. See table in text for analysis.	Samples by Kennedy Minerals Co., 1958. Twenty one samples from jack hammer cuttings and one 68-foot drill hole in the deposits in sec. 30 showed an average CaO of 50.64 percent and MgO of 1.23 percent. Large reserves of limestone probably suitable for use in the manufacture of portland cement are indicated.
422	Erskine Creek deposits	Secs. 8, 9, 16, T27S, R33E, MDM, and to the southeast intermittently for about 8 miles on both sides of Erskine Cr., 2½ miles southeast of new Isabella	Undetermined, 1958	Numerous pendants of thin-bedded white, blue-gray, and banded limestone, dolomite, and dolomitic limestone crop out along Erskine Cr. The carbonate beds strike NW., dip steeply NE. and are underlain by quartz diorite. Distribution of dolomite is haphazard, but beds of white crystalline limestone occur as much as 20 feet thick.	Has not been worked. (Brown 16:517; Logan 47:246; Tucker 29:70; Tucker, Sampson, Oakeshott 49:278t).
	Hendrickson deposit	Reported at the mouth of Grizzly Canyon, about 3 miles southwest of Tehachapi (1888); not confirmed, 1958	Undetermined, 1958; J. J. Hendrickson (1888)	Fine to coarse grained, white to pale blue crystalline limestone. Contains some graphite and highly siliceous in places.	Uncorrelated name. May be same as Lee, which see herein. (Goodyear 88:310).
	Isabella deposit				See South Fork Valley.
423	Jameson (Jammison; Blue Diamond) deposit	SW¼ sec. 14, T32S, R33E, MDM, 2½ miles northeast of Tehachapi	J. W. Jameson Corporation, 541 South Spring Street, Los Angeles. Leased to Monolith Portland Cement Company, P.O. Box 65947 Glassell Station, Los Angeles (1958)	Blue-gray to glassey white coarse-grained crystalline pre-Cretaceous limestone underlain by quartzite and mica schist crops out in the SE¼ and NW¼ of sec. 14. The limestone strikes NE. and dips SE. See Monolith Portland Cement Company in text.	The Jameson Lime Company began quarrying limestone from the vicinity of sec. 14 about 1900. The limestone was burned in 2 nearby kilns and the product was called "blue diamond." In 1915 the Blue Diamond Company was formed and lime buring was continued until about 1921 when the deposit was acquired by the Monolith Portland Cement Company, which see in text. (Aubury 04:19t; 06:70-71; Brown 16: 516-518; Haley 22:51, 60; Logan 47:246; Tucker 21:312; 29:70).
	Jammison deposit				See Jameson.

LIMESTONE, DOLOMITE, AND CEMENT
(LIMESTONE, cont.)

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
424	Keene (Mountain Summit Lime Co.) deposit	Sec. 15, T31S, R32E, MDM, on the north side of Tweedy Cr., 1 3/4 miles northeast of Keene Post Office	John S. Broome (Loop Ranch) Keene (1958)	Medium-to coarse-grained white and gray pre-Cretaceous crystalline limestone set in mica schist and granite crops out in a group of en echelon pendants from south of Tweedy Cr. northeast at least 7 miles to Gold Pan Cyn. on Caliente Cr. The limestone pendants strike from N. 30° E. to N. 15° W. and are vertical or dip steeply E. The principal limestone bed in sec. 15 is about 350 feet thick with 2 mica schist interleaves, each about 25 feet thick. Also many thin, discontinuous, limestone pendants ranging from 2 to 50 feet in thickness.	The Mountain Summit Lime Company, Los Angeles, burned large quantities of lime in 6 kilns during the early 1900's. Three main quarries were mined on the steep north-trending ridge north of Tweedy Cr. and the limestone was moved to the kiln site in Tweedy Cr. by aerial tramway. The largest quarry is about 100 feet long, 75 feet wide, and face 40 feet high. The steep dip of the main limestone bed and the mountainous terrain appear to limit the rock recoverable by open-pit mining methods. Some pendants contain very white crystalline limestone, but with graphite flecks. Idle 1958. (Aubury 04:19t; 06:71; Brown 16:518; Logan 47:247; Tucker 29:72).
425	Kennedy Minerals Company (Isabella, South Fork Valley) deposit	Secs. 31, 32, T26S, R34E, MDM, 6½ miles east of new Isabella, 1½ miles south of State Hwy. 178	Kennedy Minerals Co., Inc., 2550 E. Olympic Blvd., Los Angeles (1958)	White and gray crystalline limestone and dolomite of pre-Cretaceous age crops out in a body about 1½ miles long and ranging from 500 to 1,500 feet in width. The carbonate rocks are bounded by schist and quartzite.	See text.
	Kramer deposit				See Tecuya.
426	Lebec deposit	Secs. 13, 14, 23, 24, 25, T9N, R20W, and secs. 19, 30, 31, T9N, R19W, SBM, 4½ miles west of Lebec, north of Frazier Park	Mineral Materials Co., 1145 Westminster Ave., Alhambra (1959)	Coarsely-crystalline white to gray limestone occurs in several roof pendants in Mesozoic granite.	Under development, 1959. See text.
427	Lee deposit	NE¼ sec. 36, T32S, R32E, MDM, at the mouth of Grizzly Cyn., 3 miles southwest of Tehachapi	Undetermined, 1958; Thomas Lee (1896)	Gray and white medium-to coarse-grained pre-Cretaceous crystalline limestone crops out in several small pendants on the east side of Grizzly Cyn. The limestone is much interleaved with granite and schist.	May be the same as Hendrickson. Developed by several small open cuts, the largest is 20 feet long, 25 feet wide, and 10 to 15 feet high. The foundation of one rubble stone "pot" lime kiln remains where lime was burned as early as 1890. Idle 1958. (Crawford 96:628).
428	Los Angeles Aqueduct, South quarry deposit	NW¼ sec. 2, T11N, R15W, SBM, 3 miles due south of Tehachapi	Pete Vukich, Old Town Rd., Tehachapi (1958)	White to gray, coarse-grained, crystalline pre-Cretaceous limestone. The limestone is much interleaved with schist and intruded by granitic rocks.	Source of the first limestone used at the city of Los Angeles cement plant at Monolith, 1909. An aerial tramway, 4,700 feet long delivered limestone from the quarry to a bin at the foot of the hill. The limestone was transported to the cement plant over 5¼ miles of narrow gauge railroad. Active 1909-1912. Inactive 1958. (Board of Public Service Commissioners of the City of Los Angeles 16:98-110).
429	Microwave Station deposit	SE¼ sec. 22, SW Cor. sec. 23, NW¼ sec. 26, NE¼ sec. 27 (proj.), T9N, R18W, SBM, 5½ miles northeast of Lebec in the southwestern Tehachapi Mts.	Undetermined, 1958	Paleozoic (?) limestone crops out over about 7 square miles in the NE¼ of the Lebec quadrangle, mapped by Crowell (1952), and extends into the SW¼ of the Neenach quadrangle, mapped by Wiese (1950)	See text. (Crowell 52:1-23; Wiese 50: 1-50).
	Mountain Summit Lime Co. deposit				See Keene.
	Oil Canyon deposit	Reported in SE¼ sec. 12, T32S, R34E, MDM, (1884); not confirmed, 1955	Undetermined, 1955	Compact yellow limestone was reported by Hanks (1884, p. 110) to exist in large quantity, and to crop out for half a mile.	No limestone was found in place in 1955. Some limestone float was found along the bottom of Oil Cyn. in gray, dissected fan material. The limestone float material is brown to gray, hard, dense and fine grained. It appears to be a good lithographic stone. (Hanks 84:109-110; 86:96).
	Poirier deposit	Reported in Pine Grove Cyn., south of the Summit Lime Co. (1888); not confirmed, 1958	Undetermined, 1958; Godfrey Poirier (1888)		Uncorrelated name. May be included in the Summit Lime Company property. Quarry and kiln under development in 1888. (Goodyear 88:311).
430	Sand Springs Canyon deposit	SE¼ sec. 26, T9N, R20W, SBM, 1 mile northwest of Frazier Park, east side of Sand Springs Cyn.	Undetermined, 1958	White, coarse-grained, pre-Cretaceous crystalline limestone crops out in a small pendant in granitic rocks.	Small quarry. See table in text for analysis. Idle 1958.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
431	Seeger deposit	SW¼ sec. 31, T32S, R33E, MDM, in Grizzly Cyn. 3 miles southwest of Tehachapi	Undetermined, 1958: Henry Seeger (1896)	White and gray coarse to very coarse-grained pre-Cretaceous crystalline limestone crops out in several small pendants in granite and schist. The limestone bodies strike N. 15° W. and dip 45° NE. The limestone is banded, contains numerous flakes of graphite and is much intruded by granite.	Developed by several small quarries. The main quarry is roughly circular, 75 by 100 feet in diameter, and 25 feet deep. The foundations of 2 rubble stone "pot" lime kilns remain where lime was burned as early as 1888. Idle 1958. (Crawford 96:628; Goodyear 88:310).
432	Snowball deposit	NE¼ sec. 33, SE¼ sec. 28, NW¼ sec. 34, SW¼ sec. 27, T11N, R14W, SBM, 9½ miles southeast of Tehachapi between Willow Springs Rd. and Bean Cyn. on the southeast flank of the Tehachapi Mts.	Monolith Portland Cement Company, P.O. Box 65947 Glassell Sta., Los Angeles owns the part of the deposit in secs. 28, 33, 34 and California Portland Cement Company, 612 South Flower St., Los Angeles owns sec. 27	Blue gray crystalline pre-Cretaceous limestone strikes NE. and crops out for about 1¼ miles southwest of Willow Springs Rd. There are 4 limestone beds, 100 feet, 50 feet, 30 feet, and 15 feet thick separated by quartzite and mica schist and surrounded by granite. Substantial reserves of carbonate rock are indicated.	No known production. Scheelite-bearing garnet tactite occurs in the east central part of the SE¼ sec. 28.
433	South Fork Valley (Isabella, Kennedy Minerals Co.) deposit	Secs. 24, 25, T26S, R33E, MDM, 5 miles northeast of new Isabella astride State Hwy. 178	Undetermined, 1958	Limestone crops out on both sides of the South Fork of Kern River. South of the river thin-bedded white, blue-gray, and banded limestone, dolomite, and dolomitic limestone interleaved with schist crop out in an arcuate mass ranging from 250 to 500 feet in width and about 2 miles long. The beds strike N. 10° - 30° W. and dip 40°-65° NE. White coarsely crystalline limestone occurs in a few beds as much as 20 feet thick but is commonly only several feet thick. Distribution of white and gray dolomite is haphazard through the carbonate rocks. Other carbonate bodies crop out to the southeast between Long and Goat Ranch Cyns. (Kennedy Minerals Co. deposit, see text) and west of Nichols Peak.	No known production except from the Kennedy Minerals Co. deposit (see text). (Logan 47:247; Tucker 29:70; Tucker, Sampson, Oakeshott 49:279t).
434	Summit Lime Co. (Union Lime Co.) deposit	Secs. 34, 35, T12N, R15W, SBM, and adjoining land in Antelope Cyn., 3 miles due south of Tehachapi	Summit Lime Co. c/o Elliott S. Wyman, pres., 2130 Workham Way, Sacramento (1958)	Mixed carbonate and argillaceous metasedimentary rocks, of probable Paleozoic or early Mesozoic age, surrounded by and intruded by granitic rock. Beds strike NW., dip 60° SW. to 60° NE.	See text. (Aubury 04:19t; 06:71-72; Brown 16:479, 518-519; Crawford 96: 628-629; Goodyear 88:311; Haley 22:52; Jenkins 42:322t; Logan 47:247-248; Tucker 20:35; 21:312; 29:72-73; Tucker, Sampson 41:578; Tucker, Sampson, Oakeshott 49:275t, 279t).
	Tardy deposit	Reported 3 miles west of Cinco (1929); not confirmed, 1958	Undetermined, 1958; Jack Tardy, Los Angeles (1929)	Several small bodies of medium-grained blue-gray limestone occur in a northeast-trending northwest-dipping band of pre-Cretaceous metasedimentary rocks along the north side of the Garlock fault zone. The narrow band of metasedimentary rocks extends southwestward toward Tehachapi Pass from a locality about 1 mile west of Cinco.	No known production. (Tucker 29:72; Logan 47:247).
435	Tecuya (Cuddy Canyon, Kramer) deposit	Secs. 21, 27, 28, 34, 35, T9N, R20W, SBM, 1½ miles west of Frazier Park, north side of Cuddy Cyn.	Mineral Materials Co., 1145 Westminster Ave., Alhambra (1959)	White to gray coarsely-crystalline limestone in a pendant in Mesozoic granite crops out on the steep north side of Cuddy Cyn. The pendant is 200 to 1,300 feet wide and about 2 miles long. It strikes northwest and dips 40° NE.	Under development, 1959. See text. (Fairbanks 94:495; Logan 47:246; Tucker 24: 191; 29:70; Tucker, Sampson, Oakeshott 49:278t).
436	Tollgate deposit	SW¼ sec. 1, SE¼ SE¼ sec. 2, and E½ sec. 11, T31S, R33E, MDM, in mountainous terrain east of Tollgate Cyn. 8½ miles northeast of Tehachapi	Jess E. Hicks 7657 Seville Ave., Huntington Park (1958)	Massive blue-gray dolomitic limestone of pre-Cretaceous age trends northeast and crops out for about one mile along the strike and is about half a mile wide. The thickness is apparently at least 1,000 feet. The limestone is surrounded by granitic rocks and schist, but appears to be reasonably free from interleaving of them.	No development except for sampling. In 1958, Monolith Portland Cement Company collected grab samples at regular intervals along a line perpendicular to the trend and about 400 yards long. The samples were composited and analyzed chemically. They showed high magnesium oxide (15.2 percent) and high silica (8.34 percent). Idle 1958.
	Union Lime Co. deposit				See Summit Lime Co.
437	Undetermined	SE¼ sec. 3, T32S, R33E, MDM, 3 miles northeast of Tehachapi	J. W. Jameson Ranch, Tehachapi (1958)	Narrow pendant of white to gray pre-Cretaceous crystalline limestone in schist.	Small quarry 50 feet by 75 feet in plan and 25 feet deep apparently yielded limestone for lime burning. The remains of a rubble stone "pot" kiln is nearby. May be part of the long inactive Jameson Lime Co. operation, which see. Idle 1958.

LIMESTONE, DOLOMITE, AND CEMENT
(LIMESTONE, cont.)

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
438	Undetermined	Reported to be in SE¼ sec. 27, T10N, R16W, SBM (proj.), 7½ miles northwest of Antelope Valley Pumping Station, on the west side of Canyon del Secretario	Undetermined, 1958	Wiese (1950) shows pendants of Paleozoic (?) limestone surrounded by granite in this area.	Local residents report that limestone was quarried for rubble stone and used under the Los Angeles aqueduct pipe line during initial construction about 1910. (Wiese 50: map).
439	Undetermined	SE¼ sec. 14, T11N, R15W, SBM, 6 miles south of Tehachapi in the Tehachapi Mts.	Undetermined, 1958	White, fine-to medium-grained pre-Cretaceous crystalline limestone crops out on a steep hillslope on the north side of a narrow valley near the center of sec. 14. The limestone contains a small proportion of graphite flakes and some gray bands.	Several small quarries yielded limestone for a rubble stone "pot" kiln, part of which remains in the valley floor. Probably dates from about 1900 when many small lime-burning operations were active in the Tehachapi area. Idle 1958.

MARBLE

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
440	Antelope Valley (Pescado Creek) deposit	SW¼ sec. 2, T9N, R17W, SBM, 8 miles northwest of Antelope Aqueduct Station on the east side of Pescado Cr., south slope of the Tehachapi Mts.	Undetermined, 1958; Southern California Marble Company, San Francisco (1914)	Pendant of pre-Cretaceous limestone in Jurassic (?) granite. Deposit consists of white sugary calcite marble, some with reddish-brown to orange and yellow streaks and some pinkish buff and white mottled. Beds strike N. 85° E., dip 70° NW. Marble is cut by northeast-trending shear zones but the beds do not contain well defined fracture planes. Areal geology mapped by Wiese (1950).	Developed by quarry 100 feet long, irregular bench about 50 feet wide and faces 10 to 20 feet high. Marble apparently does not extend much beyond quarry limits, but several large blocks remain in quarry face. Reported to have been first worked before 1900 and to have yielded marble for several buildings in Los Angeles and San Francisco. Idle 1958; probably last worked about 1904. (Aubury 06:100; Brown 16:520; Crawford 96:629; Tucker 29:73; Tucker, Sampson, Oakeshott, 49:278t; Wiese 50:48).
441	Cluff Ranch deposit	SE¼ sec. 31, T10N, R16W, SBM, 1000 feet northeast of Cluff Ranch on the east side of Canada del Agua Escondida, 8 miles north-northwest of Antelope Aqueduct Station on the south slope of the Tehachapi Mts.	Tejon Ranch Co., P.O. Box 1560 Bakersfield (1958)	White, medium-grained, sugary, massive dolomitic marble of pre-Cretaceous age strikes N. 50° W., dips 60° NE. Locally contains narrow veinlets of greenish silicate minerals and a few small black schist bodies and has red iron oxide stain in fractures and a few graphite flakes. Irregular metamorphic pendant about 2,500 feet long and 300 to 1000 feet wide in granite. Rather regular joint pattern exposed in quarry face with joint planes 6 inches to 4 feet apart. Areal geology mapped by Wiese (1950). See table in text for analysis.	Developed by quarry on one level, 150 feet long across strike of the marble beds, 50 feet wide and faces of 50 feet. Reported locally to have been used for rubble stone under the Los Angeles Aqueduct pipe line during initial construction about 1910. Another small carbonate pendant, 3½ miles to the northeast on the west side of Canyon del Secretario is also reported to have been used in the Aqueduct project. Idle in 1958 and apparently for many years. (Wiese 50:48).
	Pescado Creek project				See Antelope Valley.
	San Emigdio Canyon deposit	Not determined, 1958	Undetermined, 1958		Marble is reported to occur in San Emigdio Cyn.; deposit has not been worked. (Brown 16:520).
	Tehachapi deposit	Not determined, 1958	Undetermined, 1958		Fine-grained yellow, mottled, brecciated marble was reported in 1886 to occur 9 miles west of Tehachapi in Bright's Valley. Excavations existed at that time and several large quarried-out blocks remained. Pre-Cretaceous limestone occurs in the vicinity of Brite Valley but the yellow marble locality was not found in 1958. (Brown 16:520; Goodyear 88:310; Hanks 86:23).

TRAVERTINE

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
442	Allen deposit	NW¼NE¼ sec. 16, T27S, R33E, MDM, on the northeast side of Erskine Cr. about 3 miles southeast of new Isabella	John Allen, Bodfish (1958)	Calcareous spring deposit. According to Walker and others (1956, p. 31) the calcareous material fills fractures in weathered granite and forms a hard limy cap at the surface. The calcareous rock crops out for several hundred yards along the base of the hill.	Prospected for radioactive material. Idle 1958. (Walker, Lovering, Stephens 56:10t, 31).

Lithium

A fraction of 1 percent of lithia (Li_2O) is contained in mill tailings composed of clay (shale) from the borate deposit at Boron, both in San Bernardino County (Arundale and Mentch, 1955, p. 654). The mineralogy of the lithia-bearing material has not yet been determined.

Lithia is also found in brines at Searles Lake and in hectorite (lithia-bearing bentonite) deposits southeast of Barstow. Some of the playa lake deposits and bentonite clay deposits in Kern County may contain traces of lithia, but only the Boron deposit has been reported.

Magnesite

By William E. Ver Planck

Magnesite has been produced in Kern County from a single deposit near Bissell in the Mojave Desert. The entire output was obtained in the World War I period when the steel industry of the eastern United States was deprived of its supply of refractory grade magnesite from Austria-Hungary. Steelmakers turned in desperation to California, where a small tonnage of magnesite, mostly for pulp mills and magnesium oxychloride cement, had been produced for a number of years. There followed a wild scramble to develop new deposits, but the refractory market vanished before the new industry could establish itself in California. Following World War I, a specialty magnesia industry was established that consumed California magnesite, some of which was found to be especially suitable. Since about 1940, however, most magnesia specialities have been made from sea water, bittern, or brine. Magnesite is still used in the manufacture of refractories; but only large, uniform deposits that are amenable to low-cost open-pit mining have economic value.

Magnesite has three major geologic occurrences: (1) as replacement bodies in dolomite, (2) as fracture fillings and replacement bodies in serpentine, and (3) as sedimentary deposits associated with playa lake beds. The Kern County deposit at Bissell is a sedimentary deposit and was the first of this type to be found in California. Moreover, it is the only sedimentary magnesite deposit in California to have been worked commercially. In general, the sedimentary magnesite deposits are smaller and less pure than the deposits associated with dolomite and serpentine.

Bissell Deposit. Location: NE¼ sec. 11, T. 10 N., R. 11 W., S.B.M., 8 miles southeast of Mojave. Ownership: Southern Pacific Company, 65 Market Street, San Francisco (1958).

The Bissell magnesite deposit was discovered by B. M. Denison, D. S. Clark, C. A. Williams, and J. N. Conover, probably in 1907 (Brown, 1916, p. 519). Exploratory work, consisting of shallow pits and trenches, was begun in 1911 (Gale, 1912, p. 1115); late in 1914 or early in 1915, the deposit was leased to the Rex Plaster Company, an important contemporary magnesite producer. At a plant in Los Angeles this company calcined magnesite for use in magnesium oxychloride cement. The Rex Plaster Company held the deposit through 1916 and produced most of its total output. A smaller tonnage was mined in 1917 and 1918 by the International Magnesite Company for its calcining plant near San Diego, where magnesite from a number of deposits was calcined for refractory use. Rubey and Callaghan (1936, p. 114-115) state that the Bissell deposit . . . "yielded 6,625 tons in 1915, 7,687 tons in 1916, 1,135 tons in 1917, 284 tons in 1918, and 26 tons in 1923, a total production of 15,757 tons." The deposit has been idle since 1923.

The magnesite of the Bissell deposit forms a group of thin beds associated with the Bissell formation of Miocene or Pliocene age (Dibblee, 1958). The Bissell formation consists of a lower unit of limestone, dolomite, chert, and shale; a middle unit of clay shale with magnesite layers; and an upper unit of arkosic sandstone, conglomerate, and siltstone. It lies conformably on tuff of the Gem Hill formation (Dibblee, 1958) and is unconformably overlain by fanglomerate. White magnesite beds, mostly less than a foot thick, are interbedded with dark, swelling bentonite to form a magnesite-rich unit ranging from a few feet to 75 feet in thickness. A maximum of 50 percent of the magnesite-rich unit consists of magnesite, and the magnesite itself contains as much as 10 percent SiO_2 and 5 percent CaO. Magnesite-bearing beds, which do not crop out, have been exposed in cuts for a distance of 4,200 feet along the south slope of a low hill. They are crumpled and faulted, but in general strike nearly west and dip 20° to 60° S.

Palmer (1916) described the operations of the Rex Plaster Company. The stripping of a maximum of 6 feet of unconsolidated sand and gravel was with horse-drawn scrapers. Benches 10 to 20 feet high and 15 feet wide were excavated parallel to the beds, using a minimum of explosives. Waste and magnesite were carefully removed layer by layer, mostly by hand picking. Each chunk of magnesite obtained required cleaning with hand tools to remove any objectionable clay that adhered to it. The proportion of overburden and clay handled to magnesite recovered was 6 or 7 to 1. A force of 25 men and 12 teams of horses produced 45 tons per day of acceptable magnesite, which contained not more than 11 percent SiO_2 and 3 percent CaO. Ultimately the pits made in this way totaled 2,800 feet in length and a maximum of 30 feet in depth. The Rex Plaster Company also did some underground development including a 100-foot vertical shaft and 550 feet of drifts and cross cuts. Some magnesite was obtained from an experimental square-set stope, but this method of mining was too costly. A room and pillar system using rooms 30 feet wide supported by light timbers was thought to be feasible, but it would not have been possible to recover the magnesite in the pillars.

Rubey and Callaghan (1936, p. 117) state that most of the magnesite readily available from open pits beneath shallow overburden already has been taken. They estimate the reserves of magnesite for 100 feet down the dip from the open pit at 100,000 tons.

MAGNESITE

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
443	Bissell	NE¼ sec. 11, T10N, R11W, SBM, 8 miles southeast of Mojave	Southern Pacific Co., 65 Market Street, San Francisco (1958)		See text. Bradley 25:47; Brown 16:519; Gale 12:1115; 14b:512; Simpson 34:412; Tucker 21:312; 29:73; Tucker, Sampson, Oakeshott 49:279t).
	Walker's Pass	Near Walker Pass	Undetermined		Specimen, believed to have come from Walker Pass, was examined by F. L. Hess, approx. 1906-1907. (Bradley 25:50; Hess 08:39).

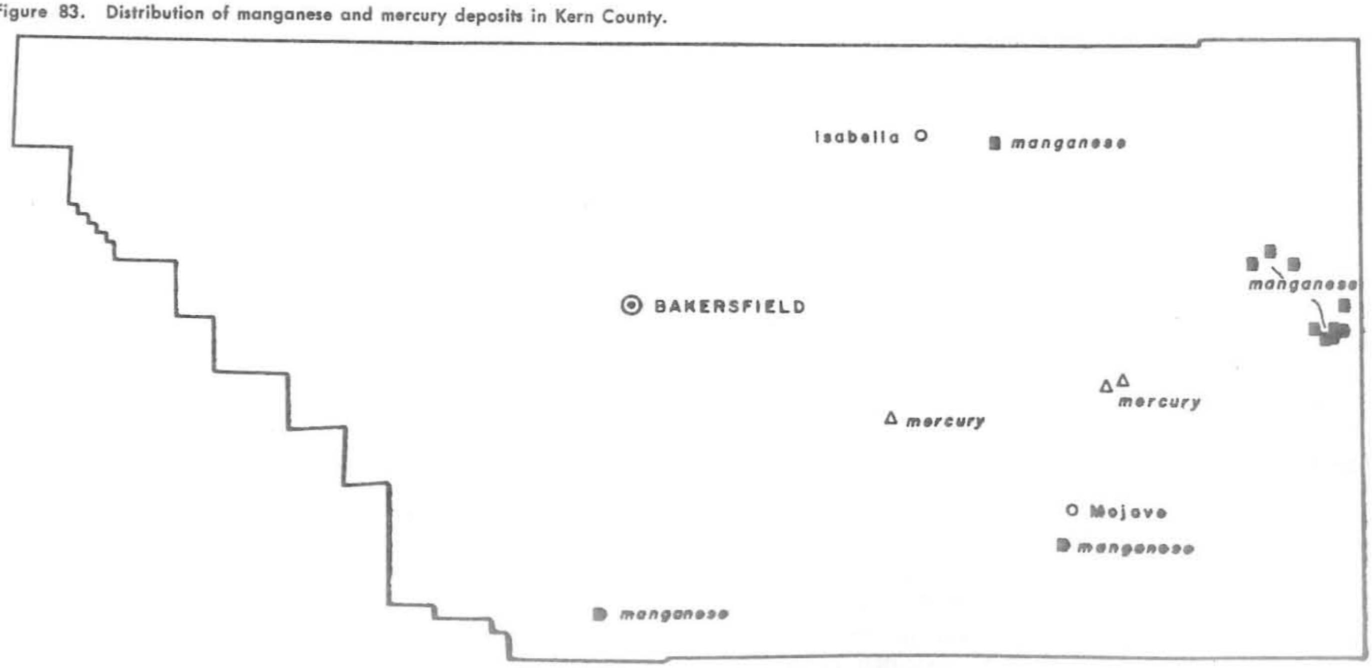
Manganese

At least 10 manganese-bearing deposits in Kern County (fig. 83) have been explored, but none has yielded more than a few tons of commercial material nor do any of them appear to contain large reserves. The total production of manganese ore from Kern County is only a few tens of tons, which was sold during the years 1918 and 1954. During the years 1956, 1957, and 1958 a few hundred pounds of rhodonite suitable for cutting and polishing was mined from the B.H.P. mine near Randsburg. More than half of the manganese deposits are near Randsburg in the Rand Mountains; the others are scattered deposits in the Sierra Nevada, El Paso Mountains, Soledad Mountain, and Pleito Hills.

Most of these deposits are in siliceous rocks, especially quartzite, quartz-rich mica schist, or quartz veins along faults in schist. Manganese oxides are the most abundant manganese minerals in the mined material; rhodonite ($MnSiO_3$) is found at the O. K. mine near Weldon, and at the B.H.P. (Manganese Queen), Big Indian and Midlothian mines (Trask, 1950, p. 84-85) near Randsburg. Spessartite garnet ($Mn_3Al_2Si_3O_{12}$) is found with rhodonite at the B.H.P. mine. Nearly all of the manganese deposits in Kern County contain a moderate to high proportion of silica, and are therefore unsuited for use by the steel industry.

B.H.P. (Manganese Queen) Mine. Location: SE¼ sec. 16, T. 30 S., R. 40 E., M.D.M., Rand district, 4 miles southwest of Randsburg. Ownership: Mrs. Malvina I. Hart, 32 Ave. 30, Venice, and Clayton E. Perry, Venice, own two claims.

Figure 83. Distribution of manganese and mercury deposits in Kern County.



MANGANESE

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Apache mine			Traces of manganese oxides in limestone.	See under copper (Trask, et. al. 50:84; Trask, Wilson, Simons 43:63, 66t, 123t).
444	B. H. P. (Manganese Queen) mine	SE¼ sec. 16, T30S, R40E, MDM, Rand dist., 4 miles southwest of Randsburg	Mrs. Malvina I. Hart, 32 Ave. 30, Venice, and Clayton E. Perry, Venice (1957)	Manganiferous quartzite in schist and manganiferous pods in schist.	See text. (Trask, et. al. 50:84; Trask, Wilson Simons 43:66t, 78, 123t).
445	Big Indian mine	SW¼ sec. 11, T30S, R40E, MDM, Rand dist., about 2 miles south of Randsburg	Warren E. Devel, address undetermined (1957)	Manganiferous bodies along quartzite bed in Rand schist. Two manganiferous bodies about 50 feet apart: south body 10 feet wide, 50 to 60 feet long, 8 feet deep; north body 2 to 6 feet wide, 40 feet long. Both bodies taper out along strike. Schist and manganiferous bodies strike N. 5° E., dip 40° to 70° W.; locally contain white quartz veins. Bodies contain hard manganese oxides associated with manganiferous quartzite, spessartite, tephroite (?), rhodonite, and probably other manganese minerals.	See also Holly Rand under gold. Development consists of bulldozed cuts and shallow open cuts. Small piles of handsorted manganiferous material in both areas. (Trask, et. al. 50:84; Trask, Wilson, and Simons: 43:123t).
	Cuddy prospect				See Snowy No. 1. (Trask, Wilson, Simons 43:78, 123t; Trask et. al. 50:86-87).
446	Culbert Bros. mine	NE¼ sec. 10, T30S, R40W, MDM, 2 miles southwest of Randsburg		Siliceous manganese oxide float.	See Culbert group under gold. (Trask, Wilson, Simons 43:66t, 123t; Trask et. al. 50:84).
	Eagle Roost claim			Thin stringers in fault zone contain manganese oxides; host rocks are Paleozoic metasedimentary rocks.	See Jewell group under gold. (Dibblee, Gay 52:59t).
	Exposed Treasure mine			Manganese-dioxide is part of gangue material in gold-bearing veins in rhyolite.	See also Standard group under gold. (De Kalb 07 : 317; Trask, Wilson, Simons 43:123t; Trask et. al. 50:84).
	Keough prospect				See O.K. (Trask, Wilson, Simons 43:78; Trask et. al. 50:85).
	Lovett and Sullivan group				Also stibnite. Probably same as Midlothian mine, which see. (Boalich, Castello 18b:10t; Bradley 18:93t).
	Manganese Queen mine				See B.H.P. (Trask, Wilson, Simons 43:66t. 78, 123t; Trask et. al. 50:84).
447	Midlothian mine (Medlothian)	NE¼ sec. 8, T30S, R40E, MDM, Rand dist., 3½ miles southwest of Randsburg, northwest slope of Rand Mts.; not confirmed, 1957	Unconfirmed, 1957: M. J. Lovett, Randsburg (1918)	Manganese oxides in quartzite bed in Rand schist. Quartzite bed dips 75° W. to 55° SW.; offset by fault. Manganese most concentrated on the two walls of the quartzite bed. Contains finely intermixed silica and iron-stained silica skeletons. Also scheelite-bearing quartz veins that strike N. 60° E. and dip steeply NW. in schist. Scheelite content low.	Small amount of exploration work before 1918 yielded 20 tons of material from which was hand-sorted 5 tons of material that contained 32 percent manganese and 43.4 percent insoluble material. (Chesterman 44:5; Trask, Wilson, Simons 43:123t; Trask et. al. 50:84-85).
448	O K (Keough) prospect	Probably in sec. 27, T26S, R34E, MDM, about 3 miles southwest of Weldon; not confirmed, 1958	Undetermined, 1958; F. F. Keough and H. R. McAllistar, Taft (1942)	Rhodonite crystals and partly oxidized rhodonite in 2 to 5 foot-wide bed in quartz-mica schist; strike N. 45° W., dip 60° SW. to nearly vertical. Sample collected across 5 foot width of oxidized and unoxidized rhodonite contained 20.15 percent manganese by assay (Trask, 1950, p. 85).	Developed by shaft 30 feet deep on top of a hill. Probably no production (Trask, Wilson, Simons 43:65t, 78, 123t; Trask et. al. 50:85).
	Rainbow prospect				See under gold.
449	Shamrock No. 2 prospect	Reported in sec. 26, T29S, R40E, MDM, Rand dist., 2 miles by road north of Randsburg (1942); not confirmed, 1957	Undetermined, 1957; R. H. Dymond, E. R. Taber, Jack Boatright, and M. J. Meadows (1935)	Pockets of siliceous manganese oxide in 1 to 2 foot-thick quartzite bed in Rand schist. Bed strikes N. 50° W., dips 30° NE., exposed on surface for a distance of 20 feet. Small part of deposit is high-grade manganese oxide with little or no siliceous material. Average grade estimated to be 20 percent manganese (Trask, 1950, p. 86).	Shaft 15 feet deep and drift 20 feet long in quartzite-manganiferous rock. Probably no production, long idle. (Trask, Wilson, Simons 43:123t; Trask et. al. 50:85-86).

MANGANESE, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
450	Snowy No. 1 (Cuddy) prospect	Center sec. 12, T9N, R21W, SBM, Pleito Hills, near headwaters of Pleito Cr., 2 miles east of Antimony Peak	Undetermined, 1958; R. C. Cuddy, address undetermined (1942)	Siliceous manganiferous rock in quartz-mica schist. Hard psilomlane and soft, black manganese oxide occur in two bodies of quartz-mica schist about 400 feet apart in granitic rock. The largest body is 250 feet long and 40 feet wide and has been exposed in 4 open cuts to a depth of 6 feet. One sample taken across a 12-foot cut contained (by assay) 12.98 percent manganese (Trask, 1950, p. 86); another sample from a 40-foot cut contained 3.34 percent manganese.	Accessible by 3 mile walk along trail. Developed by 4 open cuts from 12 to 15 feet long, 3 feet wide, and 6 feet deep. No production. (Trask, Wilson, and Simons 43:78, 123t; Trask et. al. 50: 86-87).
	Walsh and McClaude group				See Colorado Camp group under copper. (Trask, Wilson, Simons 43:123t; Trask et. al. 50:87).

The B.H.P. mine has been operated intermittently and on a small scale since before 1918. Approximately 27 tons of silicious manganese ore was mined before 1918; four tons of sorted material contained 43 percent of manganese and 23.8 percent of insoluble material (Trask, et al., 1950, p. 84). Several hundred pounds of material consisting of rhodonite, manganese oxides, and spessartite has been mined and sold to lapidaries since 1956. Two or three men work intermittently to obtain lapidary material.

The manganiferous rock is in two areas about 600 feet apart. Both occurrences are in Rand schist. The lower and southernmost is a tightly folded layer of manganiferous quartzite or chert, from 2 to 4 feet wide, that is exposed in an area of low relief several hundred square feet in size. The layer is discontinuous and repeated locally by faults. The general strike of the manganiferous layer and the schist is west, and the layers dip moderately southward.

The upper is in quartz-mica schist and crops out on the west side of a small hill 600 feet north of the lower deposit. It consists of discontinuous pods containing quartz, rhodonite, spessartite, and hard manganese oxides. The pods lie along a fault (?) zone that strikes N. 35 E., dips steeply southeast, and is roughly parallel to layering in the schist. The northernmost pod in this zone is about 4 feet thick, 15 feet long, and several feet in exposed depth. It was the largest one exposed in 1959. A narrower pod lies about 75 feet farther southwest of it. The area between the two pods has been excavated and filled in. Axinite, rhodochrosite, and tephroite also have been identified in samples collected from the pods (C. W. Chesterman and D. F. Hewett, personal communications, 1958).

Masses of black manganese oxides, as "shells" around the pods in the northern area and as lenses in the quartzite in the lower area, were probably the sources of the material mined before 1918. Only a few tens of pounds of this material was observed in the deposits in 1959.

Workings in the lower area consist of an inclined shaft a few tens of feet deep and several shallow trenches and pits. The upper area has been explored for about 100 feet in a series of irregular trenches 10 to 15 feet wide, 5 to 20 feet deep, and each about 30 feet long. They are arranged in step-like fashion.

Mercury

The Walabu mine, about 7 miles northwest of Tehachapi, has been the only commercial source of mercury in Kern County. It has yielded about 1,300 flasks of mercury (Bailey and Swinney, 1947, p. 9), probably valued at about $150,000. The principal periods of production were 1916-20, 1929-31, and 1936-40.

Mercury also was found in a few prospects less than 1 mile east of the Walabu mine, and at several prospects near Cinco about 25 miles northeast of the Walabu mine (fig. 83). The deposits in the Cinco area are widely scattered between Pine Tree Canyon and Jawbone Canyon.

Cinnabar (HgS) is the principal mercury-bearing mineral at all the localities in Kern County. It is associated with Tertiary rhyolitic dikes in Mesozoic granitic rocks at all the localities except the Mammouth prospect, near Cinco, where the cinnabar is in carbonate rocks. In addition to the localities included in the accompanying tabulation, cinnabar has been noted at several localities in Jawbone Canyon. Some of these deposits have yielded small pieces of nearly pure cinnabar.

*Walabu (Cuddeback, Walibu) Mine**. Location: NE¼ sec. 27, T. 31 S., R. 32 E., M.D.M., southern Sierra Nevada, 1 mile northeast of the Tehachapi Loop on Southern Pacific Railroad, 7 miles northwest of Tehachapi. Ownership: Walabu Mining Co., P.O. Box 582, Bakersfield; Mrs. W. F. Buass, president and administratrix, owns mineral rights to 230 acres in northeast and center of section 27. Land is within boundaries of Loop Ranch, John S. Broome, agent, Keene (1959).

Development of the Walabu mine was begun in 1916 following the discovery of cinnabar by J. E. Hicks (Gillan, 1917, p. 79), though development of the area as mineral land began as early as 1904 (Mrs. W. F. Buass, personal communication, 1958). By the end of 1916, J. E.

* Compiled mainly from a description by Bailey and Swinney, 1947, p. 9-14.

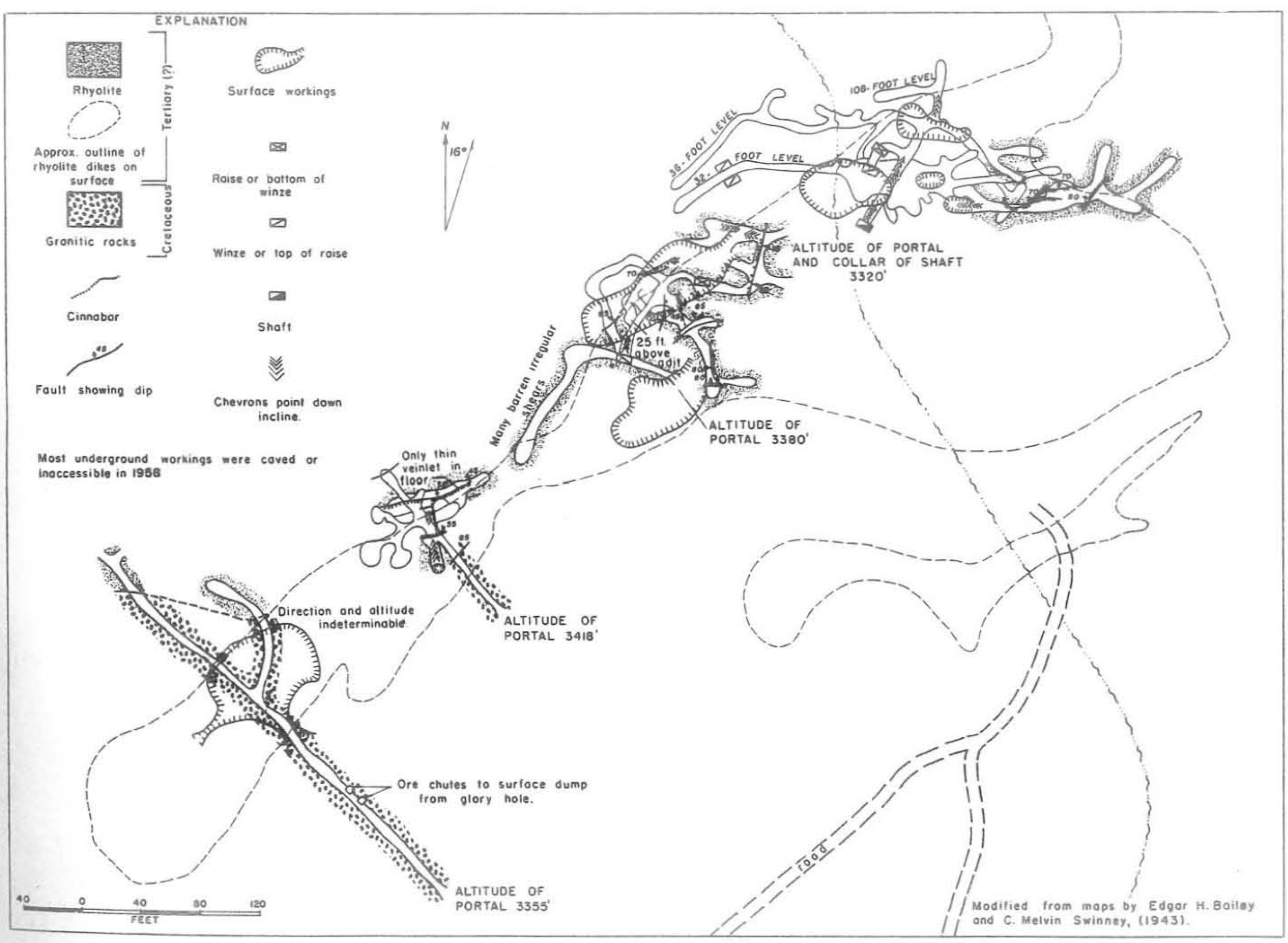
Hicks and W. N. Cuddeback had recovered 30 flasks of quicksilver from ore treated in a 12-pipe Johnson-McKay retort installed on the property. In 1917, they leased the mine to the Cuddeback Cinnabar Company, which recovered 595 flasks of quicksilver in the period 1917-20, and then discontinued the operation (Bailey and Swinney, 1947, p. 11). In 1927, the property was leased to Santa Ana Mining Company which, under the management of C. D. Holmes, recovered nearly 500 flasks of quicksilver by the end of 1931 (Ransome and Kellogg, 1939, p. 380). The Santa Ana Mining Company installed a small rotary furnace and did considerable underground development work. The mine was leased to Walabu Mining Company in 1936 and the property later was sold to the company. Since 1936, only a small amount of quicksilver has been produced from the mine.

It is credited with a total production of about 1,300 flasks of quicksilver (Bailey and Swinney, 1947, p. 9). The Walabu mine is the southernmost of the known deposits of quicksilver in the Sierra Nevada.

Mesozoic granitic rock is the most common rock in the vicinity of the mine. It is intruded by rhyolite dikes (fig. 84) of probable middle to late Tertiary age. The largest dike is about 900 feet long, a maximum of 250 feet wide, trends northeast, and dips steeply northwest. Other dikes within 500 feet of the largest dike trend northwest and are 10 to 30 feet in average width. The borders of the dikes are sheared and altered to clay. The cinnabar is only in the brecciated and altered zones in rhyolite. The richest and largest ore bodies appear to be localized in the more gently dipping parts of the brecciated zones and to have a clayey hanging wall; intersections of fractures also are favorable zones. Elsewhere the cinnabar is too widely disseminated to be of ore grade.

Cinnabar is the only ore mineral at the Walabu mine. Much of it is in thin incrustations on the walls of fractures, and fills small breccia veins. A small proportion is in disseminated minute crystals in clayey material. Pyrite was reported to have been abundant in a rich ore body

Figure 84. Geologic map of the Walabu mercury mine.



MERCURY

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Cuddeback mine				See Walabu in text.
451	Fickert-Durnal prospect	SE¼SW¼ sec. 26, T31S, R32E, MDM, 1 mile east of Tehachapi Loop on So. Pac. R.R.	John S. Broome, Oxnard (1958). Prospect is on private land of Loop Ranch	Altered and brecciated pegmatite dike in granitic rocks strikes NW. and dips NE. Dike is altered in an 18-foot wide brecciated zone which contains cinnabar in seams and as disseminated particles. Principal shear is on hanging wall of dike.	Principal development work done about 1917. Consists of 3 partly-caved short drift adits on south side of a ravine and a 25-foot caved shaft near bottom of the ravine. A 6-pipe retort constructed in 1917 was used to recover a small amount of quicksilver. Idle since 1917. (Boalich, Castello 18b: 11t; Bradley 18:49; Ransome, Kellogg 39:382; Tucker 21:314).
452	Hixson lease	SW¼ sec. 26, T31S, R32E, MDM, 1 mile east of Tehachapi Loop, 7 miles northwest of Tehachapi, ¼ mile from U. S. Hwy. 466	John S. Broome, Oxnard; leased to Merrel E. Hixson, P.O. Box 422, Tehachapi (1958)	Irregular zones in rhyolite dike are altered to clayey material and impregnated with finely-disseminated cinnabar and contain cinnabar coatings on fractures. Zones on surface are few inches in average width, and few feet long. Rhyolite is 20-30 feet wide, about 100 feet long, and white on fresh surface. Dike trends N. 60° W. in granitic rock. Occurs at crest of smooth-surfaced hill.	Developed by several small prospect pits along fractures and by 30-foot vertical shaft at westernmost exposure of rhyolite. Equipped with 10-foot rotary furnace with water-cooled condensor pipe. Probably no production. Part-time development work in 1957-1958.
453	Mammouth prospect	NE. corner sec. 10, T31S, R36E, 3½ miles west-southwest of Cinco, 1¼ miles south of Chuckwalla Mt.	Harvey and Mildred Crawford, P.O. Box 602, Mojave (1958)	Wispy veinlets and disseminated fine grains of cinnabar in aragonite (?) and around borders of inclusions of altered granite and carbonate rocks in a thin septum of broken, altered, and recemented sedimentary rocks in granite. Septum is vertical and strikes N. 50° W. on northeast side of a ridge. It is about 6 feet in average width and a few hundred feet long. Cinnabar-bearing part of septum is 18 inches in average width and a few tens of feet long in center of southeast end of septum. Siliceous metasedimentary rocks are on southwest side of ore zone; carbonate rocks are on northeast side. Average content of cinnabar in ore zone is estimated to be 0.025 percent or less.	Two claims. Septum is developed by crosscut adit near southeast end; open cut about 40 feet long, 10 to 20 feet deep, and 4 to 6 feet wide; a 10-foot drift adit at northwest end of open cut; and a few trenches farther northwest. A 2-chamber furnace for roasting the ore is a few feet north of portal of crosscut. Firebox is below two 6-foot by 14 inch horizontal iron retorts for ore which are connected to a 12-foot vertical condenser pipe. Probably not more than a few tons of ore were roasted. No production. Idle since 1940's.
	Tardy prospect	Reported in sec. 1, T31S, R36E, MDM, west of Cinco, ¼ mile upslope from Los Angeles aqueduct (1918); not confirmed, 1957	Undetermined, 1957	Quicksilver in "igneous dike" in granite (probably rhyolite dike).	Unconfirmed prospect. May be same as Mammouth claim, which see. (Bradley 18:49).
454	Walabu (Cuddeback, Walibu) mine	NE¼ sec. 27, T31S, R32E, MDM, 7 miles northwest of Tehachapi, 2½ miles southeast of Keene	Walabu Mining Co., c/o Mrs. W. F. Buass, P.O. Box 582, Bakersfield (1958)	Cinnabar in dikes of Tertiary rhyolitic rock.	Only commercial source of cinnabar in Kern County. See text. (Bailey Swinney 47:9-14; Bradley 18:47-49; 186:79; Ransome, Kellogg 39:380-382; Tucker 29:60-61; Tucker, Sampson, Oakeshott 49:271t).
	Walibu mine				See Walabu mine in text.
	Undetermined	Vicinity of Jawbone Cyn.	Undetermined	Cinnabar in veinlets as much as 1 inch thick in Tertiary rhyolite. No systematic distribution noted.	Some of the veinlets have yielded small pieces composed of nearly pure cinnabar. (Martin Engle, personal communication, 1958).

mined from the Number 2 shaft in the gully about 200 feet west of the northeastern end of the large rhyolite dike, but was less abundant elsewhere (Bailey and Swinney, 1947, p. 13).

The first ores mined contained several percent of mercury. Later mined material contained 7 or 8 pounds of mercury to the ton. Ore averaging 7 or 8 pounds per ton is reported to be still in place in the 108-foot level of the Number 2 shaft (Sam Cuddeback, personal communication, 1958). Some ore probably containing less than 7 or 8 pounds per ton was mined by glory hole excavation and was concentrated before being retorted. Only a trace of cinnabar was visible in the open cuts observed in 1958. Bailey and Swinney (1947, p. 14) point out that opportunities for finding other bodies of mineable ore, however, are sufficient to warrant further exploration of the rhyolite dikes in the surrounding area. Several holes were drilled in the vicinity of the large rhyolite dike in 1953-54 as part of an exploration program approved by D.M.E.A., but no ore bodies were found.

The Walabu mine workings consist of 6 adits from 40 to 320 feet long, an inclined shaft about 120 feet deep, and several open pits and glory holes in an area about 700 feet long and 300 feet wide (fig. 84). The horizontal workings total about 2,300 feet in length. The westernmost working is a 320-foot crosscut adit near the southwest end of the large rhyolite dike. It extends beneath an open pit about 80 feet long and 50 feet wide. The other adits are spaced at approximately 150-foot intervals northeast of the 320-foot adit.

About 120 feet northeast of the 320-foot adit is the caved portal to the oldest workings, which were extended principally to the southwest from the southwest side of a gully and are quite irregular in plan. They aggregated several hundred feet in length and were probably on more than one level. A glory hole about 120 feet long, from 20 to 50 feet wide, and an average of a few tens of feet deep, was developed to recover low-grade ore after the richer ore was exhausted in the oldest underground workings. Some of the underground workings above the main haulage level were engulfed in the glory hole.

Number 2 shaft, about 60 feet west of the portal to the old drift, is in the bottom of the deep gully east of the old workings. The shaft is inclined moderately north-northeast and becomes progressively steeper at depth. Drifts were extended from 100 to 200 feet east and west from the shaft at the 32- and 66-foot levels, and some crosscuts were developed. At the 108-foot level a drift was extended 40 feet westward. These shaft workings have been flooded since several years before 1943. About 250 feet of drifts were extended eastward from the east side of the gully into the northeast part of the large rhyolite dike.

Molybdenum

Numerous deposits of molybdenum are known in Kern County, but by 1948 none had yielded commercial quantities of molybdenum ore. Most of these contain molybdenite (MoS_2) and powellite ($CaO.(MoW)O_3$) associated with scheelite in contact metamorphic deposits, which are common in the Greenhorn Summit, Kernville, Red Mountain, and Erskine Creek areas. Powellite also has been noted in El Paso Mountains (Hess, 1917, p. 48) and in the tin deposits of the Gorman district (Wiese and Page, 1946, p. 36). Molybdenite is a minor constituent of granite between Hoffman and Butterbread Canyons near Cinco (Murdoch and Webb, 1956, p. 231). Molybdenum-bearing minerals are associated with gold- and copper-bearing quartz veins at several localities in the central part of El Paso Mountains.

Natural Gas (see Petroleum Fuels)

Peat (see Coal and Peat)

PERLITE

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
455	Black Eagle group	SE¼ sec. 8, W½ sec. 9, and NW¼ sec. 17, T29S, R38E, MDM, El Paso Mts., east side of Last Chance Cyn., 9 miles north-northeast of Cantil	Rolf L. Meuer and others, c/o Della G. Gerbracht, P.O. Box 346, Randsburg (1958)	Brecciated, vesiculated, gray perlite in member 2 (Dibblee, 1952) of Pliocene Ricardo formation. Perlite overlies andesite breccia which caps most of the hilltops. Locally, perlite crops out in area of few thousand square feet. Maximum thickness of layer is about 30 feet.	Fourteen lode claims and 3 placer claims. Small amount of development work done. No production; idle. See also Grey Eagle group. (Dibblee, Gay 52:50, 63t; Tucker, Sampson, Oakeshott 49:249, 279t).
456	Eisenman claims	Reported in sec. 22, T31S, R34E, MDM, 4 miles northeast of Monolith (1949); not confirmed, 1958	Undetermined, 1958; Walter C. Eisenman, P.O. Box 46, Monolith (1949)	Dark gray irregular flows of perlite "associated with perlite breccia, rhyolite flows, tuffs, domes of dacite, and lacustrine sedimentary rocks of Miocene age" (Tucker, Sampson, and Oakeshott, 1949, p. 249).	An idle prospect. No production. (Tucker, Sampson, Oakeshott 49:249).
457	Grey Eagle group	Secs. 4, 9, T29S, R38E, and sec. 32, T28S, R38E, MDM, El Paso Mts., 10½ miles north-northeast of Cantil	Della G. Gerbracht and others, P.O. Box 346, Randsburg (1958)	See Black Eagle group.	Three lode claims and 1 placer claim on north end of Black Eagle group, which see. No production; idle. (Dibblee, Gay 52:50, 63t; Tucker, Sampson, Oakeshott 49:249, 279t).

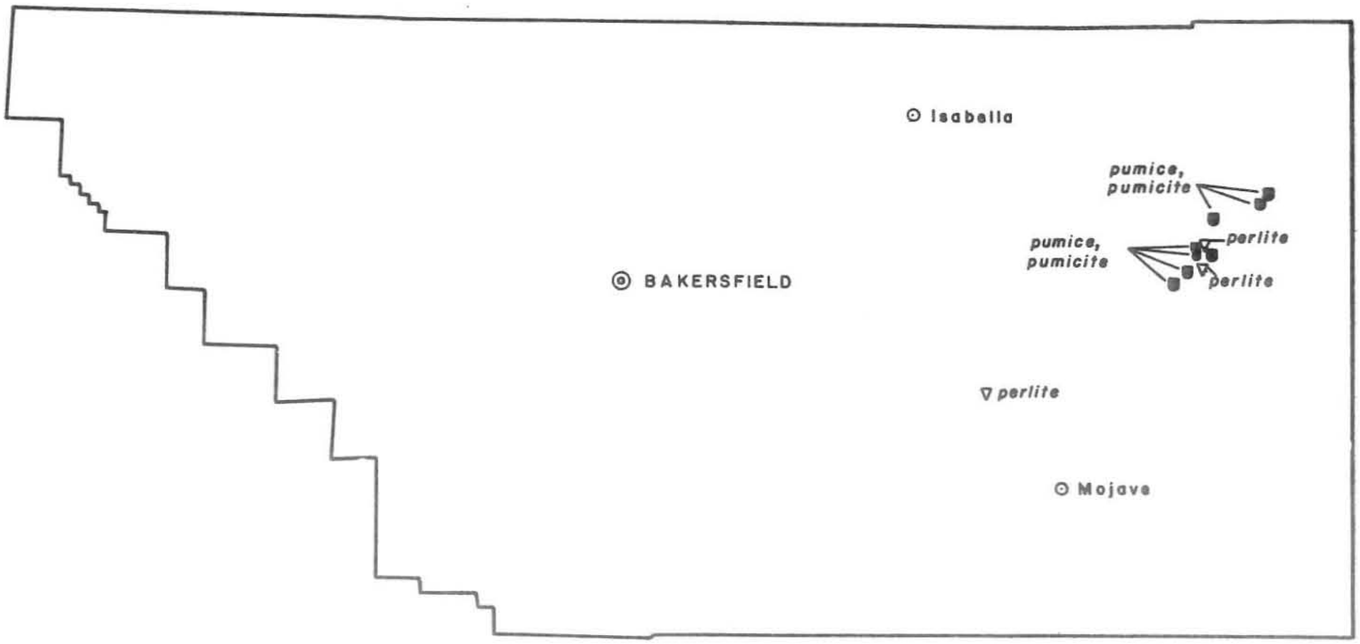


Figure 85. Distribution of perlite, pumice, and pumicite in Kern County.

Perlite

Two perlite-bearing areas (fig. 85) in Kern County have been prospected but not placed in production. One area is about 7 miles northeast of Monolith in the southern Sierra Nevada; the other is in El Paso Mountains about 15 miles northwest of Randsburg.

The perlite northeast of Monolith is in irregular flows in lacustrine sedimentary rocks of Miocene age. In El Paso Mountains, the perlite is in lacustrine sedimentary rocks of Plio-Pleistocene age. The deposits are described in the tabulated lists.

Petroleum Fuels

By Earl W. Hart

The petroleum fuels—crude oil, natural gas, and natural-gas liquids—comprise more than 85 percent of the value of all mineral commodities produced in Kern County (table 1). In 1957, the combined value of the petroleum fuels reached an all-time high of $319,534,000. Of the 1957 total, crude oil accounted for $273,746,000, natural-gas liquids $26,934,000 and natural gas $18,854,000, ranking these commodities first, third, and fourth, respectively, among the County's mineral products.

Exploratory drilling in Kern County has been relatively high during the last decade, but new reserves of the petroleum fuels have not kept pace with production. Consequently, reserves of liquid hydrocarbons and natural gas have been decreasing in the past few years. However, new field and new pool discoveries made in 1957 and 1958, although not yet fully evaluated, may provide substantial new reserves. New and more efficient methods of recovery may also add significantly to the future reserves of the petroleum fuels in Kern County.

Geology

All of the oil and gas fields discovered in Kern County are in the San Joaquin Valley and in the surrounding foothills to the west, south, and east. This valley and foothill region comprises the most petroliferous portion of what is commonly known as the San Joaquin Basin (fig. 86). Being as much as 60 miles wide and extending 250 miles north-northwest from the Tehachapi Mountain to the vicinity of Stockton, the San Joaquin Basin is one of the largest structural features in California. From late Cretaceous time to some time during the Pleistocene epoch, this basin has been inundated repeatedly by seas of shallow to moderate depth. Deposition of predominantly clastic sediments under constantly changing conditions has resulted in the formation of a sequence of shale, siltstone, sandstone, and conglomerate which locally aggregates as much as 30,000 feet thick and covers an area of about 3,500 square miles in Kern County alone. Because of gradual downwarping, as the sediments accumulated, the sedimentary strata lie in a broad regional syncline whose axis is parallel to, but considerably west of, the geographic centerline of the Valley (fig. 86). Underlying the sedimentary rocks on the east side of the basin and cropping out in the Sierra Nevada foothills are granitic and metamorphic rocks of pre-late Cretaceous age. Upper Jurassic and Cretaceous rocks of the Franciscan group are exposed in the Coast Ranges and underlie Upper Cretaceous sedimentary strata along the western margin of the San Joaquin Basin. Although sedi-

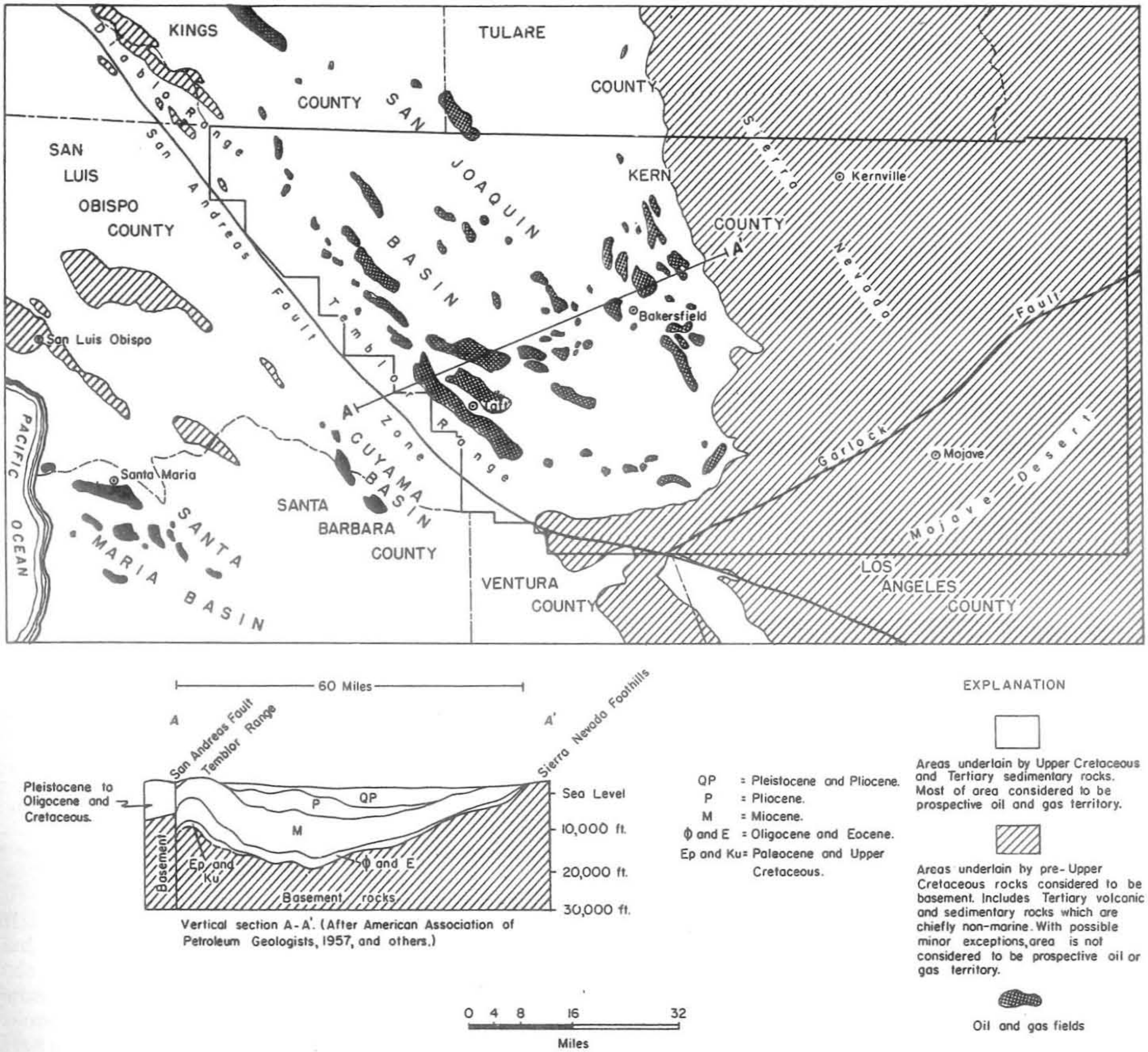


Figure 86. Sketch map of productive oil fields and potentially productive areas in Kern County.

mentary rocks are present in the Franciscan group, they are not known to be oil- or gas-bearing, and are generally considered to be "basement rocks."

Although marine Paleozoic and Mesozoic sediments were deposited in eastern Kern County, the rocks have been metamorphosed, deformed, and largely removed by erosion, and have not proved to be favorable targets for petroleum. Tertiary marine rocks which underlie part of the western Mojave Desert just south of Kern County have been drilled, but none has yielded petroleum to date. In most wells, igneous and metamorphic rocks were encountered at a relatively shallow depth.

Three conditions are necessary for the formation and accumulation of oil and gas: (1) a source rock rich in organic material from which petroleum can form; (2) a porous and permeable reservoir rock into which oil and gas can migrate and accumulate; (3) a structural or stratigraphic trap to prevent upward migration of the hydrocarbons, allowing oil and gas to accumulate in the reservoir rock.

Nearly all commercial accumulations of petroleum in Kern County are relatively near source rocks that are or were rich in organic matter. These source rocks are the organic shales and other fine-grained rocks derived from

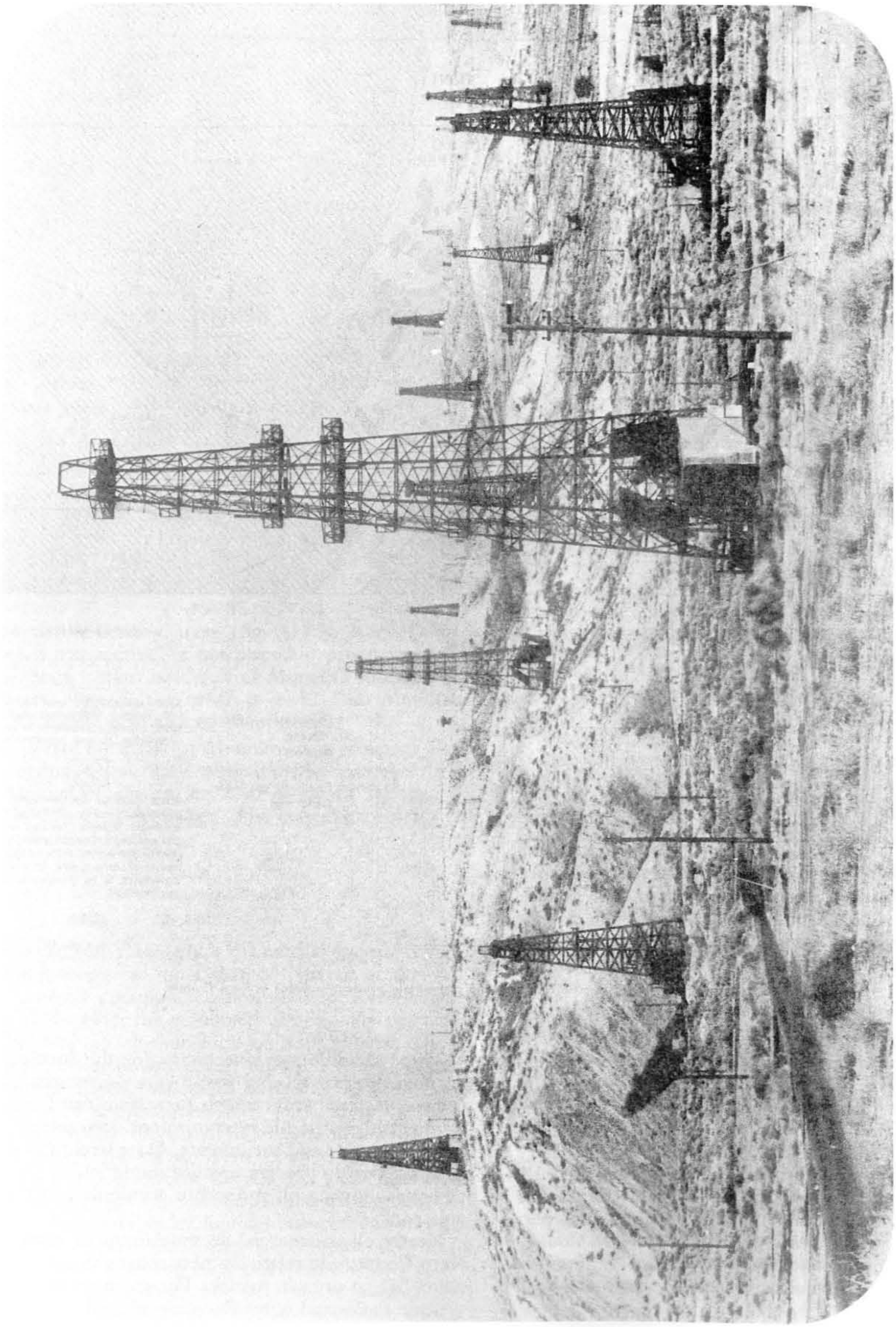


Figure 87. View of an anticlinal structure, Buena Vista Hills. Exploration of this anticline in 1909 led to the discovery of oil and gas. ***Photograph courtesy Standard Oil Company of California.***

sediments deposited in the San Joaquin Basin from late Cretaceous to early Pleistocene time. Although oil and gas were probably derived from rocks representing all of the epochs of this interval, source rocks of the Miocene and Pliocene epochs were by far the principal sources of oil and gas in the county.

Sandstones and conglomerates (often collectively referred to as "sands") are the principal reservoir rocks in Kern County. Oil and associated wet gas are obtained from reservoir rocks which range in age from Eocene to Pleistocene (table 14). Not all of the productive sands are of marine origin, many being formed in brackish and nonmarine environments. The accumulation of oil in these nonmarine sands is believed to be the result of up-dip migration of the petroleum from marine source beds. Some of the important petroleum-bearing nonmarine formations are the Tulare, Kern River, and Chanac. The Kern River formation, for example, has yielded about 340,000,000 barrels of oil from the Kern River field. The Tulare formation is productive at the Midway-Sunset, McKittrick, Cymric, and Belridge fields and the Chanac formation at several fields on the east side of the valley. Dry gas, not associated with oil, is primarily in Pliocene sands, but older rocks have yielded minor amounts of gas. In addition, oil and wet gas have been obtained from fractured Miocene shales at the South Belridge, Wasco, Midway-Sunset, and McDonald Anticline fields and from weathered and fractured schist at the Edison field. Reservoir rocks of Miocene and Pliocene age have accounted for the great bulk of oil produced in Kern County. Table 14 shows the 1957 and cumulative oil production from formations of various ages in the county. Productive formations and depths at several typical fields are indicated in the accompanying correlation chart (table 15).

*Table 14. Production of crude oil in Kern County fields by geologic ages.**

Age	Production (millions of bbls.)	
	1957	Cumulative to 1-1-58
Pleistocene	7	457
Pliocene	26	1,516
Miocene	52	1,257
Oligocene	3	36
Eocene	3	10
Jurassic? (basement rocks)	1	29

* Data from Conservation Committee of California Oil Producers, Annual Review, 1957, table 20.

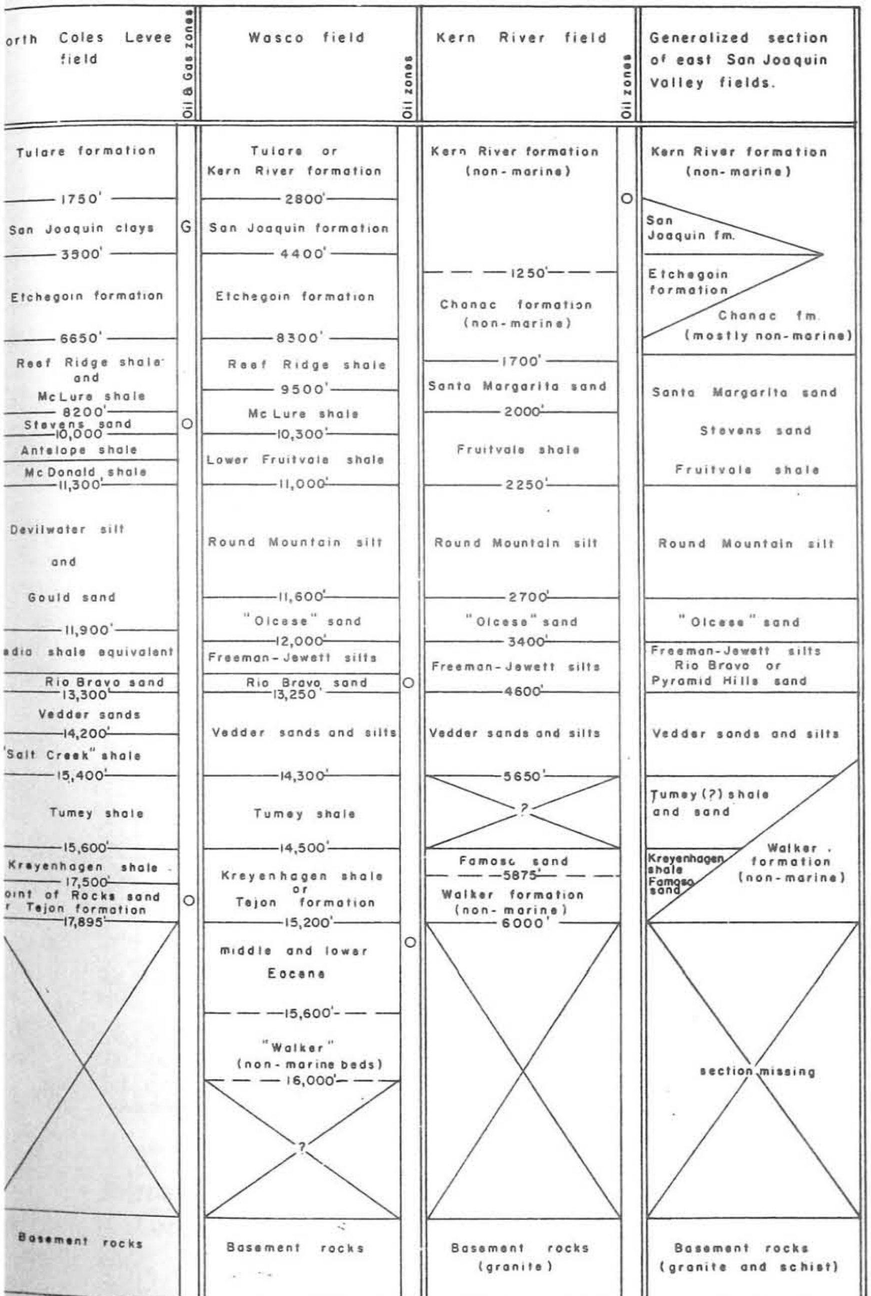
Before oil and gas accumulations can be of commercial value, the upward and lateral migration of these hydrocarbons must have been impeded by a trap. The accumulations of oil and gas in Kern County fields are mostly in structural and stratigraphic traps. Structural traps can be subdivided into anticlines and faults, many of which have been superimposed on the regional syncline in the San Joaquin Valley. These structural features are strongly aligned in a northwesterly direction parallel to the axis of the Basin and to the San Andreas fault. However, the folds and faults south and east of Elk Hills trend more toward the west. In general, the structural features and trends are reflected in the orientation and distribution of the oil and gas fields which are shown in figure 86. Near the flanks of the Basin, structural trends are also strongly reflected by the topographic features in the foothills surrounding the San Joaquin Valley. Major anticlines responsible for the accumulation of oil and gas in Kern County are the Kettleman Hills-Lost Hills anticline, Belridge anticline, Buena Vista anticline (fig. 87), and Elk Hills-Coles Levee anticlinal trend. Important fields owing their existence to smaller anticlines include Paloma, Rio Bravo, Ten Section, and other fields in the western and central part of the valley. Many of the fields along the east side of the San Joaquin Valley are the result of oil having been trapped against normal faults. These faults originated by tensional forces presumably brought about during the westerly tilting of the Sierra Nevada fault block. Examples of fields where normal-fault type traps exist are Mountain View, Mount Poso, and Round Mountain. Thrust and high-angle reverse faults partly control oil and gas accumulations at the North Tejon, San Emigdio, Tejon, McKittrick, and other fields along the western and southern margins of the Basin. A special type of structural trap involves fracturing. Rocks such as shale, chert, siltstone, and schist, which are normally impervious, may be locally fractured through structural deformation and rendered permeable. Traps resulting from fracturing are usually small, but the fractured schist at the Edison field has yielded over 30,000,000 barrels of oil.

The second group of traps—stratigraphic traps—is responsible for the commercial accumulation of a significant portion of the hydrocarbons in Kern County. Sediments deposited under diverse and rapidly changing conditions in the ancient San Joaquin Basin seas varied greatly in thickness, laterial extent, composition, and permeability, giving rise to numerous stratigraphic traps. Such traps may be classified as depositional (lensing, buttressing, shale-out), erosional (truncation, angular unconformity), and cementation (tar seal, cementing minerals). Examples of depositional traps are provided at North and South Coles Levee, Buena Vista Hills, Greeley, Strand, and other fields in the south central part of the valley where the widespread and permeable Stevens sand of late Miocene age grades laterally into impervious shale. Other types of depositional traps including lenticular and buttress sands, formed at the margins of ancient seas and are important in the Midway-Sunset-McKittrick district and in fields near Bakersfield. Erosional traps are also common in Kern County and generally result from angular unconformities in which the up-dip edges of tilted and truncated sandstones are overlain or capped by shale. Such types are notable at Devils Den, Midway-Sunset, and other fields along the west flank of the San

TABLE 15. CORRELATION CHART OF SEDIMENTARY F
SHOWING DEPTHS AND PRODUC

Geologic Time Scale (spaces given to ages do not indicate the formation thickness.)			Generalized section of west San Joaquin Valley fields.		Belgian Anticline field	Oil zones	Tejon field	
QUAT-ERNARY	*Pleistocene*		Tulare formation (non-marine)		Tulare formation 1400'		Kern River or Tulare formation 1400'	
TERTIARY	*Pliocene*	*upper*	San Joaquin formation				Chanac formation (non-marine)	
		lower	Etchegoin formation				2550'	
	Miocene	*upper*	Reef Ridge shale McLure shale Stevens sand Antelope shale McDonald shale		1400' Antelope shale 3700' Mc Donald shale 4000'		Transition zone Santa Margarita sa 3500' Fruitvale shale and sand 4800'	
		middle	Devilwater silt Gould shale Button beds		Gould shale 4250'		"Valv" sand 5050' Round Mountain silt 5250' "Olcese" sand 6750'	
		lower	Media shale Carneros sand Upper Santos shale Agua sand Lower Santos shale Phacoides sand Salt Creek shale		Santos shale Phacoides sand Salt Creek shale 4925'	○	Freeman – Jewett 7700' Basalt 9200' Vedder sands and sil 12,250'	
	Oligocene		Wagonwheel formation Tumey shale Oceanic sand		? Tumey shale and Oceanic sand 5000'	○	San Emigdio formati 12,700'	
	Eocene	*upper*	Kreyenhagen shale Point of Rock sand	Tejon formation	Kreyenhagen shale 5150' Point of Rocks sand 10,868'	○	Reed Canyon shale Metralla sandstone 13,100	Tejon formation
		middle	Canoas silt "Avenal" sand		(middle and lower Eocene, Paleocene, and Upper Cretaceous beds not reached, but probably exist above basement.)		Liveoak member 14,500'	
		lower	Lodo formation ?					
	Paleocene							
CRETA-CEOUS	*Upper Cretaceous*		Moreno shale Panoche formation					
Pre – Upper Cretaceous			Basement rocks (Franciscan group?)				Basement rocks (granite and schist)	

ONS IN SOUTHERN SAN JOAQUIN VALLEY, KERN COUNTY,
RMATIONS OF SELECTED OIL FIELDS.



Data after AAPG (1957, 1958), Beck (1952) and others.

Table 16. Summary of geologic, well, and production

Fields and areas	Year discovered	Geologic data		Well data		
		Type of[1] accumulation	Age of producing formations	Average number of producing wells Jul.-Dec. 1957		Average completion[2] depths (feet)
				Actual	Actual and potential	
Ant Hill	1944	FA	Miocene	26	35	3,469-3,660
Antelope Hills	1942	S & A	Miocene, Eocene	36	43	2,244-2,954
Antelope Hills, North	1950	FA	Miocene	22	22	2,476
Belgian Anticline	1946	F & A	Miocene, Oligocene, Eocene	136	166	2,593-6,825
Bellevue	1944	FA	Miocene	12	13	7,332
Bellevue, West	1957	S & F ?	Miocene	5	5	7,735
Belridge, North	1912 ?	A	Pleistocene, Pliocene, Miocene, Oligocene	122	167	1,072-9,017
Belridge, South	1911	A & S	Pleistocene, Pliocene, Miocene	1,178	1,338	1,000-3,000
Blackwells Corner	1941	FA & S	Miocene	30	35	1,177
Bowerbank (dry gas)	1942	A	Pliocene	2	6	4,000-4,900
Buttonwillow (dry gas)	1927	A	Pliocene	1	1	2,650-3,400
Calders Corner area	1949	S & A	Miocene	2	2	8,790
Canal	1937	A	Miocene	25	40	8,353
Canfield Ranch	1938	A & S	Miocene	27	30	7,755-9,728
Chico-Martinez area	1938	F	Pleistocene-Pliocene ?	6	8	1,040
Coles Levee, North	1938	A & S	Miocene, Eocene	156	170	9,227-9,897
dry gas zone	1941	A	Pliocene	1	4	5,300
Coles Levee, South	1939	A & S	Miocene	35	46	9,779-9,865
condensate zone	1938	A & S	Miocene	27	36	
dry gas zone	1941	A	Pliocene	4	6	5,300
Comanche Point	1945	F ?	Miocene	11	12	614
Cymric	1916	A & S	Pleistocene, Pliocene, Miocene, Oligocene, Eocene	463	554	1,130-6,523
Devils Den-Alferitz	1910	F & A	Pliocene, Miocene, Oligocene, Eocene	76	128	1,403-2,535
Edison	1934	S & FA	Pleistocene, Pliocene, Miocene, basement complex	757	827	1,219-5,295
Elk Hills	1911	A	Pliocene, Miocene	290	1,014	3,017-9,285
dry gas zone	1918 ?	A	Pliocene	1	6	1,000-1,500
Fruitvale	1928	S & F	Pliocene, Miocene	419	463	4,054-4,299
Gonyer Anticline area	1956	A	Miocene	2	2	1,748
Greeley	1936	A & S	Miocene	56	101	7,805-11,508
Greenacres area	1953	S	Pliocene-Miocene	2	2	4,355-4,690
Jasmin	1946	S ?	Miocene (non-marine)	7	11	2,809
Jerry Slough area	1956	A	Miocene	1	1	12,150
Johe Ranch area (dry gas)	1954	S ?	Miocene	2	2	1,420
Kern Bluff	1944	FA	Miocene	132	134	1,175
Kern Front	1925	S & F	Pliocene-Miocene	707	757	2,274-2,920
Kern River	1899	S & F	Pleistocene-Pliocene	2,911	3,183	901
Los Lobos	1952	A & S	Pliocene, Miocene	18	21	6,744-7,563
Lost Hills	1910	A & S	Pliocene, Miocene	682	735	1,715-4,929
Lost Hills, Northwest, area	1953	S & A	Pliocene	5	5	2,622
Maddux Ranch area (dry gas)	1955	?	Eocene ?	0	2	2,800
McDonald Anticline	1945	A	Miocene, Oligocene, Eocene	59	68	1,550-2,102
McKittrick	1898 ?	F	Pleistocene-Pliocene, Miocene	279	347	1,048
Midway-Sunset (including Buena Vista)[4]	1901	S & A	Pleistocene, Pliocene, Miocene	4,693	5,641	1,085-5,365
Buena Vista dry gas zone	1909	A	Pliocene	7	30	1,500-2,000
Mount Poso	1923	F	Miocene	611	648	1,415-2,616
Mountain View	1933	F & S	Pliocene, Miocene, basement complex	232	309	5,315-9,511
Nepple (Antelope Hills) area (dry gas)	1955	?	Pliocene	1	5	1,136
Paloma	1939	A & S	Miocene	52	70	10,050-11,856
condensate zone	1939	A & S	Miocene	66	82	
dry gas zone	1934	A	Pliocene	4	5	4,200-5,600
Pleito Creek	1951	A	Pliocene, Miocene	14	15	4,051
Pleito Ranch area	1957	?	Pliocene	1	1	11,674
Poso Creek	1932	F & S	Pliocene, Miocene	339	373	1,347-2,656
Rio Bravo	1937	A	Miocene	93	127	11,469-11,605
dry gas zone	1956	A ?	Pliocene	1	1	5,550-5,850
Rosedale	1951	S & FA	Miocene	20	24	5,985-6,003
Rosedale, East, area	1957	?	Miocene	2	2	6,933
Rosedale Ranch	1945	S	Pliocene, Miocene	41	44	4,384
Round Mountain	1927	F	Miocene	393	414	1,616-2,769
Semitropic	1956	A	Pliocene	2	5	7,608
dry gas zone	1935	A	Pliocene	1	4	2,000-3,500

data of oil and gas fields of Kern County.

Fields and areas	Petroleum data: A.P.I. gravity range	Petroleum data: Production 1957 (1000 barrels)	Petroleum data: Cumulative production to Jan. 1, 1958 (1000 barrels)	Petroleum data: Production per well per producing day (barrels) Jul.-Dec. 1957	[3]Natural gas (million cu. ft.): Net withdrawal from formations 1957	[3]Natural gas (million cu. ft.): Cumulative net withdrawals from formations to Jan. 1, 1958	Water production 1957 (1000 barrels)	Proved acreage as of Dec. 31, 1957
Ant Hill	13-19, 36-39	165	3,323	17.6	4	231	410	295
Antelope Hills	15-18, 26-30	361	7,286	27.5	352	4,863	1,066	370
Antelope Hills, North	15-16	162	2,243	19.5	25	385	790	260
Belgian Anticline	25-63	3,300	22,162	64.2	6,820	76,728	759	1,490
Bellevue	32-36	196	2,571	44.2	246	1,979	154	170
Bellevue, West	34-35	156	156	168.3	67	67	4	110
Belridge, North	13-62	632	62,768	20.3	2,348	443,889	1,282	1,920
Belridge, South	12-31	4,047	72,483	10.0	917	9,750	2,339	7,700
Blackwells Corner	12-15	25	585	7.0	4	82	20	220
Bowerbank (dry gas)					204	7,128	12	870
Buttonwillow (dry gas)					169	33,628	0	40
Calders Corner area	37-38	18	285	23.1	15	385	12	30
Canal	34-40	282	18,141	31.1	54	20,909	78	780
Canfield Ranch	26-35	404	5,575	43.8	597	7,867	528	540
Chico-Martinez area	12-14	7	85	7.0	0	0	2	40
Coles Levee, North	30-45	5,046	91,112	88.3	[6](6,059)	[6](18,214)	178	3,540
dry gas zone					208	64,847	tr.	[5]120
Coles Levee, South	30-40	846	17,407	75.3	2,540	54,254	48	3,300
condensate zone	50-64	[9]766	[9]15,734		[7](295)	1,886		
dry gas zone					904	31,561	32	[5]110
Comanche Point	13-14	8	67	2.3	0	tr	2	35
Cymric	11-49	3,451	66,951	20.9	1,198	68,495	7,174	2,780
Devils Den-Alferitz	13-45	324	1,748	10.7	1,149	2,216	275	730
Edison	13-29, 35-43	4,130	76,753	15.1	4,915	40,648	9,625	6,240
Elk Hills	11-44, 51	5,672	241,456	69.5	158	163,142	5,000	18,280
dry gas zone					991	93,959	tr	[5]300
Fruitvale	15-24	3,000	72,216	20.1	1,759	19,078	4,271	2,985
Gonyer Anticline area	14	2	2	3.0	3	4	8	10
Greeley	30-41	3,502	77,056	183.6	1,523	53,109	1,647	1,930
Greenacres area	19-21	4	15	18.0	0	0	14	10
Jasmin	12-17	18	427	8.0	0	0	124	80
Jerry Slough area	37	15	21	38.4	26	43	2	10
Johe Ranch area (dry gas)					0.2	0.2	0	20
Kern Bluff	14-16	341	4,771	7.0	0	0	1,422	575
Kern Front	12-17, 22	2,298	91,136	9.5	171	12,190	8,379	4,320
Kern River	11-16	4,965	336,797	5.0	4	2,442	25,353	8,585
Los Lobos	15-17, 24-25	347	1,763	50.9	77	351	157	290
Lost Hills	11-38	1,695	80,776	7.0	1,876	67,362	5,097	3,600
Lost Hills, Northwest, area	24-26	11	49	5.9	6	30	43	50
Maddux Ranch area (dry gas)					0	67	0	10
McDonald Anticline	15-41	565	3,256	27.8	221	2,162	562	520
McKittrick	13-16	1,039	103,206	10.8	80	14,941	1,509	1,160
Midway-Sunset (includes Buena Vista)[4]	11-36	22,396	1,304,771	13.6	18,399	986,770	25,054	41,410
Buena Vista dry gas zone					229	90,481	0	[5]1,500
Mount Poso	12-17	3,315	132,035	15.6	33	1,753	54,145	3,315
Mountain View	20-39	1,605	62,759	21.2	1,698	67,551	1,565	2,850
Nepple (Antelope Hills) area (dry gas)					31	155	40	0
Paloma	28-68	650	36,047	27.1	6,123	259,138	106	5,140
condensate zone	53-63	[9]470	[9]13,995		18,281			
dry gas zone					930	6,821	0	250
Pleito Creek	13-20	86	710	16.4	110	414	6	170
Pleito Ranch area	23	7	7	71.1	3	3	6	10
Poso Creek	11-15	1,654	25,152	13.8	121	2,105	6,407	2,495
Rio Bravo	34-37	4,262	85,970	129.2	2,137	64,198	1,566	1,970
dry gas zone					358	430	5	[5]40
Rosedale	27-36	293	2,448	45.0	487	3,260	228	210
Rosedale, East, area	31	21	21	68.2	45	45	tr	10
Rosedale Ranch	16-21	608	2,870	42.7	761	2,428	702	460
Round Mountain	12-25	1,589	73,160	11.2	51	661	28,474	2,430
Semitropic	28	21	35	25.9	11	19	tr	20
dry gas zone					3	14,089	0	240

Table 16. Summary of geologic, well, and production

Fields and areas	Year discovered	Geologic data: Type of[1] accumulation	Geologic data: Age of producing formations	Well data: Average number of producing wells Jul.-Dec. 1957: Actual	Well data: Average number of producing wells Jul.-Dec. 1957: Actual and potential	Well data: Average completion[2] depths (feet)
Shafter area (dry gas)	1954	S	Pliocene	2	2	4,300
Shale Point area (dry gas)	1956	?	Eocene	1	2	3,480
Strand	1939	A & S	Miocene	44	50	8,085-11,996
Strand, Northwest, area	1956	F or S	Miocene	1	1	9,810
Tejon	1935	A & F	Miocene	189	218	2,336-7,553
Tejon Flats area	1953	S ?	Miocene (non-marine)	1	1	7,199
Tejon Hills	1948	F & S	Miocene	225	255	539-1,904
Tejon, North	1957	FA & S ?	Miocene, Oligocene, Eocene	2	2	12,093
Telegraph Canyon	1955	FA	Eocene	3	3	10,580
Temblor Ranch	1900	FA	Miocene	19	26	497
Ten Section	1936	A	Miocene	107	131	8,494-8,819
Trico (dry gas)[8]	1934	A	Pliocene	35	88	2,450-3,150
Union Avenue	1941	F	Pliocene ?, Miocene	2	4	5,303
Wasco	1937	A	Miocene, Eocene	3	5	9,591-15,530
Welcome Valley	1952	S	Oligocene, Eocene	24	34	266
Wheeler Ridge	1922	A & F	Miocene, Oligocene, Eocene	131	134	1,309-10,580
Windgap area	1956	S & A ?	Miocene	6	7	8,104-8,864
Totals (from fields, areas, zones)				6,030	19,110	
crude oil reservoirs				15,904	18,992	
condensate reservoirs				93	118	
dry gas reservoirs				33	89	
Abandoned areas[10]						
crude oil reservoirs						
dry gas reservoirs						
Grand totals				16,030	19,110	

Joaquin Valley. Stratigraphic traps at several fields owe their effectiveness to cementation by tar seal at shallow depths. Oil accumulations at the Kern River and McKittrick fields are at least partly the result of tar seal.

Most fields in Kern County are the result of a combination of trapping factors. Furthermore, most fields have more than one oil or gas pool, each of which may differ somewhat from the others in trapping mechanism. Oil accumulation in the Midway-Sunset field (excluding the Buena Vista Hills and Front areas), for example, is primarily due to (1) a truncation of sandstone beds in the North Midway and Central areas; (2) lenticular, buttress, and truncated sands, as well as fractured shale at an anticlinal crest, in the Maricopa Flats-Thirty Five Anticline area; and (3) a lenticular sand in the Santiago area. Production from the Buena Vista Hills area to the east is mainly from a closed anticline with some stratigraphic and fault localization. The Buena Vista Front area flanking this anticline on the east overlies oil that has accumulated in either buttress or truncated sands. Most other fields have fewer oil and gas accumulations than the Midway-Sunset field, but many have complex traps that are not yet completely understood. The principal types of traps believed to be effective in each of the oil and gas fields in Kern County are listed in table 16.

History

Extensive oil and gas seeps along the west side of the San Joaquin Valley were known for many years before the commercial discovery of oil in Kern County and tarry oil from these seeps was used by early settlers to lubricate their wagon wheels (English, 1921, p. 36). During the early 1860s, exploratory wells were drilled and pits were dug in seeps near McKittrick and Temblor Ranch in what was probably the first oil prospecting in Kern County. The first production and processing of oil in Kern County was near Reward in the McKittrick area by the Buena Vista Oil Company. The company erected a still and refined the tarry oil from nearby seeps to obtain kerosine and lubricating oil. Crude oil was obtained from tunnels and by bailing from pits dug to a maximum depth of 8 feet. The refined products were hauled by wagon 35 or more miles to Bakersfield, San Luis Obispo, and even to the San Joaquin River at River-

data of oil and gas fields of Kern County.—Continued

Fields and areas	Petroleum data				[3]Natural gas (million cu. ft.)			
	A.P.I. gravity range	Production 1957 (1000 barrels)	Cumulative production to Jan. 1, 1958 (1000 barrels)	Production per well per producing day (barrels) Jul.-Dec. 1957	Net withdrawal from formations 1957	Cumulative net withdrawals from formations to Jan. 1, 1958	Water production 1957 (1000 barrels)	Proved acreage as of Dec. 31, 1957
Shafter area (dry gas)					743	1,706	0	80
Shale Point area (dry gas)					4	4	0	90
Strand	32-38	1,488	11,221	76.3	1,501	9,279	391	645
Strand, Northwest, area	32	9	19	22.7	1	1	3	10
Tejon	14-60	1,657	14,957	22.1	2,109	12,036	1,194	1,725
Tejon Flats area	30	3	21	9.0	1	6	3	10
Tejon Hills	25-34	588	8,954	6.5	140	1,369	2,161	835
Tejon, North	34	78	78	250.7	99	99	3	30
Telegraph Canyon	50	61	64	52.9	889	911	4	40
Temblor Ranch	15-16	23	923	3.2	0	0	243	90
Ten Section	32-38	1,577	59,811	40.1	1,864	148,110	675	1,880
Trico (dry gas)[8]					8,833	116,733	tr	10,308
Union Avenue	15-16	23	911	30.5	3	804	41	25
Wasco	21-44	9	5,062	10.7	65	3,206	40	110
Welcome Valley	11-13	4	18	0.8	0	0	2	100
Wheeler Ridge	17-45	2,378	16,047	51.1	4,622	20,862	482	840
Windgap area	36-58	69	88	46.9	627	793	1	100
Totals (from fields, areas, zones)		92,745	3,342,455	16.3	86,022	3,099,757	392,388	142,560
crude oil reservoirs		91,509	3,312,726		62,841	2,638,148	392,338	130,632
condensate reservoirs		1,236	29,729		17,986			
dry gas reservoirs					5,195	461,609	50	[5]14,018
Abandoned areas[10]			216			179		
crude oil reservoirs			216			144		
dry gas reservoirs						35		
Grand totals		92,745	3,342,671		86,022	3,099,936	392,388	142,560

[1] F = fault; A = anticlinal; S = stratigraphic; FA = faulted anticline.
[2] Gives range of average completion depths between shallowest and deepest pools.
[3] Except for those fields, areas and zones specifically designated as yielding dry gas, all natural gas figures are for wet gas, almost all of which was processed for natural gasoline and liquefied petroleum gas.
[4] Figures include the small portion of the Midway-Sunset field in San Luis Obispo County. However, the county totals reflect only that portion of the field in Kern County.
[5] Acreage of this dry gas zone is also classed as oil acreage and therefore is not included in totals.
[6] Negative figure (parentheses) due to gas storage.
[7] Negative figure (parentheses) due to gas injection for pressure maintenance.
[8] Figures include that portion of the Trico gas field in Tulare and Kings Counties. However, county totals reflect only that portion of field in Kern County.
[9] Debutanized condensate.
[10] Abandoned areas not listed above.

dale for subsequent shipment to other California markets. However, the company could not compete with prices of eastern oil products being transported in ships to California and the short-lived operation was discontinued in 1867 (Latta, 1949, p. 53).

During the next 32 years a number of wells were drilled along the western foothills of the valley and, although oil was encountered in some, none was completed as a commercial discovery. Meanwhile, asphalt refining was undertaken near McKittrick from 1870 to 1877. The magnitude of this operation is not known, but asphalt and viscous oil from seepages were probably the sole source of raw materials. Another asphalt refinery was established around 1890-92 about 6 miles southeast of Maricopa, in what is now the Midway-Sunset field. Here, heavy oil was obtained from several wells as deep as 1,300 feet. The oil was used as a flux to assist the refining of asphalt mined from the nearby seepages. Refined asphalt was hauled to Bakersfield by wagon and the lighter fractions (probably lubricating and fuel oil) were stored for local consumption or future sale. This operation ceased in 1892 when a railroad branch line was extended to Asphalto, where the Standard Asphalt Company was erecting another refinery. Asphalt for the new refinery was obtained from seepages, and, later, from veins of relatively pure asphalt. Heavy oil was used here also as a flux in refining and was obtained from two wells in what is now the McKittrick field. The Standard Asphalt Company successfully refined and marketed asphalt until 1900, when rapid development of the oil fields, especially the Kern River field, provided a more ready and versatile supply of petroleum products.

Although heavy oil and some gas were obtained from wells drilled in the McKittrick, Midway-Sunset, and Temblor Ranch areas prior to 1898, most of the oil and all of the gas produced were used locally (non-commercially) or wasted, and the balance of the oil was used mostly as a flux in the refining of asphalt. As the oil and gas in these areas were neither refined nor exported on a commercial basis, the wells drilled probably should not be considered as part of the commercial development and exploitation of the fields in which they occur.

For practical consideration, the first commercial development of an oil field in Kern County for the purpose of exploiting oil for a variety of uses was at the McKittrick field in 1898 (Zulberti, 1956, p. 50-51). In that year 10,000 barrels of oil was produced. This early development no doubt was facilitated by the existence of the Southern Pacific branch line from Bakersfield to McKittrick.

The search for oil and gas along the east side of the San Joaquin Valley also was conducted near the oil and gas seeps. Although these seeps were known for many years and some gas was obtained earlier from a shallow water well, not until 1899 was oil discovered in the Kern River field. Unlike the McKittrick field to the west, the Kern River field developed rapidly and, in 1903, 796 producing wells yielded nearly 17 million barrels of oil.

Oil exploration in the vicinity of oil seeps along the west side of the valley continued, and resulted in the discovery of the Temblor Ranch field in 1900 and the Midway-Sunset field in 1901. Again, the remoteness of the west-side fields delayed their development. Later, though, the Midway-Sunset field became the largest field in the state. Development of this field led to one of the world's greatest gushers, the famous Lakeview No. 1, which flowed out of control for 544 days in 1910-11. The well spewed a total of 8¼ million barrels of oil over the surrounding terrain, over half of which was saved by ponding it behind several dams. An historical marker was dedicated in 1952 at the site of this famous well, which is 2 miles north of Maricopa.

Prior to about 1908, all of the oil fields discovered and most of the exploratory wells drilled were near petroleum seeps. During these early years, geologic principles were applied only in a limited way. Geology became accepted as an effective tool of petroleum exploration and during the next 28 years many oil discoveries were made by determination of surface and subsurface geologic features. The prospecting of anticlinal and fault structures with surface expressions led to the discovery of such prolific fields as Buena Vista (1909), Lost Hills (1910), South Belridge (1911), Elk Hills (1911), Cymric (1916), Mount Poso (1923), Kern Front (1925), Fruitvale (1928), Edison (1934), and many others.

With the advent of the reflection seismograph, a new era in the search for oil fields was entered. This new prospecting equipment enabled exploration companies to determine the position of concealed anticlines beneath the San Joaquin Valley's almost expressionless floor. Perhaps the first success of the reflection seismograph in Kern County was in 1934 when the Buena Vista Lake gas field (now a gas zone of the Paloma oil field) was discovered. Deeper drilling of the anticlinal structure in which the gas zone was found subsequently led to the discovery of the oil and condensate of the Paloma field in 1939. In 1936, the work of a reflection seismograph party led to the discovery of the Ten Section field. This find firmly demonstrated that large anticlines and thick Miocene oil sands lie hidden beneath the valley floor. There followed, during the period 1936-39, discovery of the important oil fields of Greeley (1936), Canal (1937), Rio Bravo (1937), North Coles Levee (1938), South Coles Levee (1939), and Strand (1939). Trico, Semitropic, and Bowerbank gas fields were also found with the aid of the reflection seismograph (Hoots and Bear, 1954, p. 5-7).

By 1939, exploration for oil and gas in Kern County had progressed through three distinct stages in which (1) prospecting near seeps, (2) geologic applications, and (3) use of the reflection seismograph were successively dominant. At the end of this period all of the major fields now known had been discovered and most of the important anticlines had been explored. It became apparent that the "easy" oil and gas fields were already discovered and substantial new sources, if any, would have

to be found in more complex and less obvious traps. A new geologic approach was gradually evolved based on the fact that much of the known oil was in stratigraphic traps associated with folds and faults. Stratigraphic studies, along with seismic and other geologic methods, has facilitated the discovery of numerous small fields (e.g. Antelope Hills in 1942) and many new pools and areas associated with known fields.

The Belgian Anticline field, discovered in 1946, is probably the most important of these and has yielded about 22 million barrels of oil through 1957. Also of some significance are the 1948 discoveries of the East Gosford area (of the Canfield Ranch field) and the Tejon Hills field. The latter field is unique in that it has yielded nearly 9 million barrels of oil from average depths ranging from 539 to 1,904 feet. This is an unusual amount of oil to be obtained from a shallow depth in a recently discovered field.

Exploration and Significant Developments 1949-57

Exploratory drilling for oil and gas in Kern County has been at a record level during the past several years. On the average, nearly 200 wildcat wells per year have been drilled annually, accounting for almost a third of the exploratory wells drilled in California. Since 1953, Kern County has averaged 35 new field, area, and pool discoveries per year, which is more than a third of the new discoveries in the state. The accompanying table shows the wildcat wells drilled in Kern County and the success of these wells for a 5-year period (table 17).

*Table 17. Exploratory wells drilled in Kern County and percent successful in finding new fields, areas, and pools, 1953-57.**

	1957	1956	1955	1954	1953
Kern County					
Number of exploratory wells	182	199	192	206	215
Number of successful wells	33	41	34	28	41
Percent successful	18%	21%	18%	14%	20%
California					
Number of exploratory wells	584	603	651	632	615
Percent successful	16%	19%	15%	15%	16%
United States					
Percent successful	19%	24%	21%	19%	20%

* Data from American Association of Petroleum Geologists Bulletin, June issues, 1954 through 1958.

Several new fields have been discovered in the past few years, but only the North Tejon and San Emigdio fields appeared to be of possible major importance early in 1959. Data on the significant new field, new area and new pool discoveries made from 1949 to 1958 are listed in table 18.

Perhaps the most important new field development in Kern County in recent years was the discovery of the North Tejon oil field 22 miles south of Bakersfield at U. S. Highway 99. The discovery well, drilled in the "Main area" of the field, was completed in March 1957 at a depth of 11,500 to 12,200 feet for 245 barrels of oil daily. The productive formation is the Vedder sand of early Miocene age. Subsequent drilling in April 1958 revealed the Vedder sand to be productive in the Highway area nearly a mile to the west. Other oil zones were also discovered in the deeper Oligocene and Eocene sands in that area. In July 1958, another productive area half a mile south of the Main area was discovered, but only the Olcese sand of middle to late Miocene age was found to be oil-bearing. A fourth area 1 mile northeast of the Main area was discovered in early 1959. The Vedder sand is the productive unit in that area also. Although the trapping mechanism in the north Tejon field is not well known as yet, it is thought that the oil and associated gas have been localized by faulting and stratigraphic features on the nose and flank of a large anticline. Eighteen wells in the North Tejon field yielded 5,924 barrels of oil and 15,530,000 cubic feet of gas daily in January 1959. By April 1959, a total of 29 wells had been completed and 11 drilling rigs were active in the North Tejon field. Only the western limit of the field was known in mid-1959 and future development may reveal extensive reserves.

Ten miles west of the North Tejon field is another newly discovered field, the San Emigdio Nose field. Richfield Oil Corp. completed its discovery well in July 1958 for 2,500 barrels of oil a day. Production is from the Reef Ridge formation of upper Miocene age and is obtained from an interval of 11,452 to 11,558 feet. A follow-up well to the northwest of the discovery well was completed in September 1958 flowing a maximum of 375 barrels per day. A third well was brought in for substantial production, extending the field to the east. As of January 1959, these three well were yielding oil at a rate of 1,076 barrels daily. In March 1959, the Stevens sand of upper Miocene age was found to be productive beneath the Reef Ridge zone in the fourth successful well drilled in this area. Because of the great depth of oil in the San Emigdio Nose field, development has been slow; it is too early to evaluate the potential of this field.

Several new areas and new pools discovered in recent years in the vicinity of established fields include the Antelope Shale pool (Buena Vista Hills area, Midway-Sunset), Eocene pool (Wheeler Ridge), Northwest area (Belgian Anticline), Exeter pool (Midway-Sunset), and Basal Stevens pool (East Gosford area, Canfield Ranch). All of the pools are in zones deeper than earlier discovered pools of the respective fields.

During the 1949-57 period, four gas fields and two gas zones were discovered in Kern County. None of these, however, appears to be of significant size. To date, no major dry gas field has been found in Kern County. The moderate-sized Trico gas field, lying mostly in Tulare County, was discovered at a well drilled in Kern County.

From August 1953 to November 1955, the world's deepest well was The Ohio Oil Company's "KCLA" 72-4

*Table 18. Significant new fields, areas, and pools discovered in Kern County, 1949-57.**

Discovery date	Name of field—area—pool (discovery in italics)	Average depth of production (feet)	Oil production in Sept. 1958 (B/D)	Number of producing wells Sept. 1958	Cumulative production to 1-1-58 (in barrels)
1949-1950	(No significant discoveries)				
1951					
December 11	Belgian Anticline—*Northwest area*	2,593-4,627	4,872	56	7,847,000
1952					
March 18	Midway-Sunset—Buena Vista Hills—*Antelope shale*	4,761-4,867	7,033	107	10,381,202
April 14	Wheeler Ridge—*Eocene*	10,452	3,590	25	6,798,226
1953	(No significant discoveries)				
1954					
September 19	Midway-Sunset—*Exeter*	5,365	1,558	26	3,329,642
December 9	Tejon—Central—*J. V.*	7,234-7,553	818	24	2,857,000
1955					
September 24	Strand—Main—*73-X (Stevens)*	9,565	1,219	21	1,921,470
1956	(No significant discoveries)				
1957					
February 18	*Bellevue, West*	7,735	987	8	156,357
March 20	*Tejon, North*	12,093	3,170	10	77,741
October 18	Canfield Ranch—East Gosford—*14-19 (Basal Stevens)*	9,728	3,057	27	26,800

* Data from Conservation Committee of California Oil Producers, Annual Review—1957, p. 58-65, and Field and Pool Production Record, Sept. 1958, pp. 1-10.

in the Paloma field. The well, which cost $2.2 million to drill to a depth of 21,482 feet, was abandoned. Temperature as high as 330° F. was recorded at depths below 20,000 feet in this well. Kern County has held the world's record for deep wells on four other occasions—in 1934 (11,377 feet), 1938 (15,004 feet), 1944 (16,246 feet) and 1946 (16,668 feet).

Kern County also contained the world's deepest producing well for a short time in 1953 when Richfield Oil Corporation's well 67-29 "CLA" was completed at a depth of 17,497-17,892 feet in Eocene sand in the North Coles Levee field. The zone proved to be subcommercial and the well was later recompleted in the shallower Stevens sand of Miocene age.

Production

The combined value of the petroleum fuels in Kern County reached an all time high in 1957 when crude oil, natural gas, and natural-gas liquids valued at $319.5 million were produced—an increase of 9 percent over 1956.

Table 19. Production and value of petroleum fuels in Kern County—1947-57 and cumulative.
(Data from California Division of Mines; California Division of Oil and Gas; and U. S. Bureau of Mines)†

	Crude oil		Natural gas		Natural-gas liquids		Total value petroleum fuels ($1000)
	Production (1000 bbls.)	Value ($1000)	Production* (1,000,000 cu. ft.)	Value ($1000)	Production (1000 bbls.)	Value ($1000)	
1957	91,509	273,746	86,022	18,854	[1]8,348	[1]26,934	319,534
1956	96,485	244,493	[1]89,737	[1]19,389	9,059	29,207	293,089
1955	94,455	233,512	[1]87,000	[1]19,314	[1]8,882	30,492	283,318
1954	91,110	225,152	97,399	20,064	8,809	30,509	275,725
1953	93,580	217,069	94,345	18,222	8,509	29,474	264,765
1952	89,962	190,507	71,506	10,445	8,798	23,724	224,673
1951	89,651	191,572	76,540	10,121	9,276	25,366	227,059
1950	84,017	159,126	73,683	8,715	9,714	28,121	195,962
1949	92,045	204,849	75,965	8,719	7,887	24,664	238,232
1948	105,421	253,416	84,803	8,414	6,002	17,323	279,153
1947	106,058	176,761	88,753	8,566	5,357	10,291	195,618
pre-1947	2,278,433	2,032,193	[3]2,174,083	82,575	[2]45,500	[2]119,000	2,233,768
Grand totals	3,312,726	4,402,396	3,099,936	233,398	136,141	395,105	5,030,899

† The figures used in this table have been adjusted by the writer of this section and do not necessarily agree with figures published elsewhere in this report. Adjustments have been made on the basis of data not readily available to the other authors of this report.
* Includes gas wasted which may amount to a total of ⅓ of the production prior to 1947, but less than 2% since that time.
[1] Writer's adjusted figures.
[2] Not included in table 1.
[3] Includes about 680,000,000 Mcf of wasted gas not included in table 1.

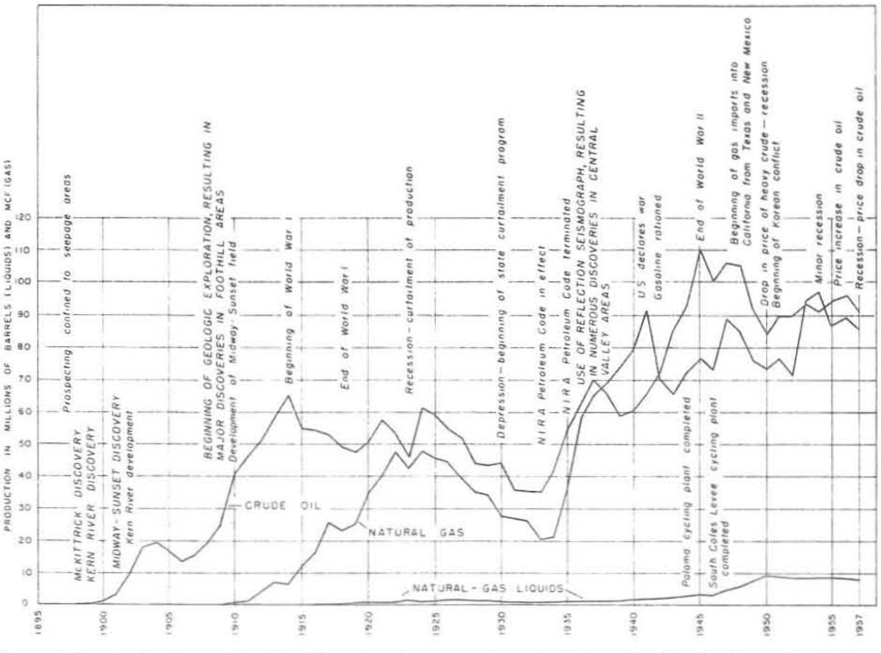


Figure 88. Production of crude oil, natural gas, and natural gas liquids in Kern County and historical events that influenced production.

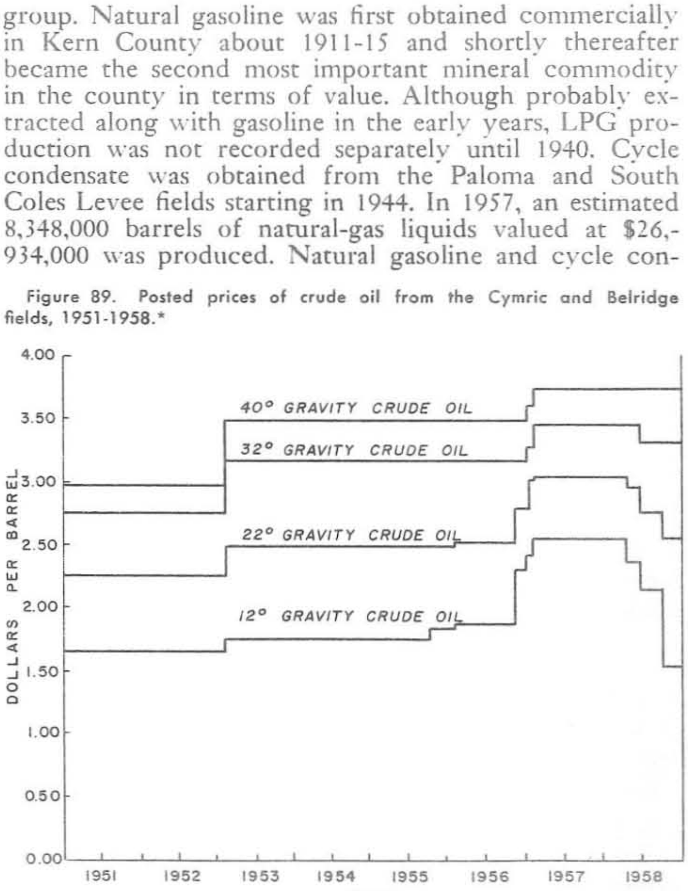
The petroleum fuels have accounted for at least 85 percent of the total value of minerals produced in Kern County. The amount and value of crude oil, natural gas, and natural-gas liquids produced yearly since 1947 are compared in table 19.

Crude Oil. Kern County oil fields yielded 91.5 million barrels of crude oil valued at $273 million in 1957 (fig. 88); a 5 percent decrease in volume and a 12 percent increase in value over the preceding year. Such an increase in value is attributable to several advances in the prices paid for crude oil by the refineries during late 1956 and early 1957. Changes in prices of crude oil at typical oil fields in Kern County from 1951 to 1958 are graphically portrayed in figure 89.

Natural Gas. Production of natural gas was first recorded in 1909 and expanded rapidly with the construction of major pipelines from Buena Vista Hills area to Bakersfield in 1910 and to Los Angeles in 1913. Peak annual production was reached in 1954 when 96,600,000 thousand cubic feet (Mcf) valued at $20 million was produced. The yield has declined slightly since then, and, in 1957, 86 million Mcf valued at $18,854,000 was produced. Of this yield, 94 percent was wet gas from oil and condensate horizons and 6 percent was from dry gas horizons. Production figures are the equivalent of net withdrawals (gas utilized plus gas wasted), but do not include gas returned (injected) to oil formations for the purposes of pressure maintenance, repressuring, and storage. During 1957, over 138 million Mcf of gas was returned to oil reservoirs, primarily to increase oil production. In December 1957, there were 18 gas injection projects operative in Kern County (Conservation Committee of California Oil Producers, 1958, Table XVIII).

Natural-Gas Liquids. Liquefied petroleum gases (LPG), natural gasoline, and cycle condensate extracted from wet gases are included in the natural-gas liquids group. Natural gasoline was first obtained commercially in Kern County about 1911-15 and shortly thereafter became the second most important mineral commodity in the county in terms of value. Although probably extracted along with gasoline in the early years, LPG production was not recorded separately until 1940. Cycle condensate was obtained from the Paloma and South Coles Levee fields starting in 1944. In 1957, an estimated 8,348,000 barrels of natural-gas liquids valued at $26,934,000 was produced. Natural gasoline and cycle con-

Figure 89. Posted prices of crude oil from the Cymric and Belridge fields, 1951-1958.*



* Data from Standard Oil Company of California "Crude Oil Posted Prices", schedules 127-129, 131-140

Table 20. Natural gas reserves of largest fields in Kern County as of Jan. 1, 1958.[1]
(1000 cubic feet)

	Reserves	Cumulative production to Jan. 1, 1958 Mcf	Net withdrawal 1957 Mcf	Gas blown to air 1957 Mcf
Dry gas				
Elk Hills dry gas zone	203,540,760	93,959,240	990,992	0
Trico gas field*	138,454,156	116,732,976	8,832,764	0
Other dry gas fields, zones and areas	18,332,506	160,436,314	3,708,488	82
Total	360,327,422	371,128,530	13,532,244	82
Wet gas (does not include dry gas zones)				
Coles Levee, South	538,219,731	56,476,010	2,244,922	3,980
Paloma	396,388,654	259,137,804	24,404,000	77,901
Coles Levee, North	384,869,398	[2](18,214,430)	[2](6,059,000)	57,858
Elk Hills	329,112,364	163,142,087	991,000	63,004
Midway-Sunset**	142,014,207	986,769,645	18,399,000	307,425
Rio Bravo	133,387,730	64,918,477	2,137,000	43,336
Belridge, North	121,222,206	443,888,577	2,348,000	9,179
Greeley	102,815,295	53,108,827	1,523,000	45,296
Other wet gas fields	222,544,645	719,401,704	26,501,834	1,470,571
Total	2,370,574,230	2,728,628,701	72,489,756	2,078,550
Total all gas	2,730,901,652	3,099,757,231	86,022,000	2,078,632

* Most of the Trico field lies in Tulare and Kings Counties.
** A small portion of the Midway-Sunset field lies in San Luis Obispo County.
[1] Data from California Div. Oil and Gas, Summary of Operations—California Oil Fields, Jan.-Jun. and July-Dec. 1957 issues.
[2] Negative figure due to gas storage and pressure maintenance.

densate accounted for 4.5 million barrels valued at $18.5 million and LPG (propane and butanes) 3.8 million barrels valued at $8.4 million.

In addition to petroleum fuels, Kern County fields yield a high proportion of water (mostly brine) with the crude oil. In 1957, over 392 million barrels of water was produced, which is about four times the amount of oil produced. Fortunately, a large proportion of the water produced is relatively fresh and can be blended with irrigation water. Probably more than half of the water is saline and unusable, however, and poses an important water-disposal problem. In 1957 most of the saline water was disposed of by percolation and evaporation in ponds and by injection into subsurface, non-oil-bearing sands. A small proportion of the water production is injected into oil sands for waterflooding purposes. This latter disposal method generally brings about an increase in oil production and at the same time precludes contamination of fresh water supplies. As a result, use of waterflooding-disposal methods will probably increase in the future. In December 1957, fifteen waterflooding projects were operative in Kern County oil pools and seven of these projects were connected with water disposal (Conservation Committee of California Oil Producers, 1958, Table XVIII).

Reserves

The California Division of Oil and Gas estimated the proved reserves of natural gas in Kern County as of January 1, 1958 to be 2,730,901,652 Mcf. Of this amount 13 percent is dry gas and 87 percent is wet gas. Natural gas reserves have generally declined in recent years. Table 20 lists the gas reserves of the largest fields in the county.

Proved recoverable reserves of liquid hydrocarbons, including crude oil, condensate, natural gasoline and LPG, are estimated to be 1.534 billion barrels as of January 1, 1958 (Stockman, 1958, pp. 72-80). As with natural

Table 21. Oil fields in Kern County with estimated ultimate production of more than 100 million barrels liquid hydrocarbons and estimated proved reserves.

Field	Discovery year	Estimated* proved reserves as of 1-1-58 (1000 bbls.)	Estimated ultimate production (1000 bbls.)
Midway-Sunset (excluding Buena Vista area)[1]	1901	177,389	1,020,712
Elk Hills	1911	490,687	732,741
Buena Vista area (Midway-Sunset)	1909	103,911	567,225
Kern River	1899	57,602	396,739
Mount Poso	1923	38,528	169,451
North Coles Levee	1938	56,308	150,843
Rio Bravo	1937	47,191	133,155
Edison	1934	50,637	127,021
Greeley	1936	45,371	122,364
Cymric	1916	52,757	119,716
Kern Front	1925	28,314	119,228
South Belridge	1911	46,081	117,015
McKittrick	1898	12,762	116,074
Fruitvale	1928	32,798	104,523
Lost Hills	1910	22,003	102,780

* Data obtained from Stockman, 1958, pp. 72-80.
[1] Small portion of field is in San Luis Obispo County.

Table 22. Listed capacities of refineries in Kern County as of January 1, 1958. (Data from Moore, 1958.)

Company	Location	Type of plant[1]	Crude oil capacity in B/D as of 1-1-58		
			Total	Operating	Shutdown
Bankline Oil Co.	Bakersfield	Complete	11,400	11,400	
Bankline Oil Co.	Maricopa	Skimming	5,000		5,000
Douglas Oil Co. of Calif.	Bakersfield	S-C	7,000	7,000	
Golden Bear Oil Co.	Bakersfield	S-L-A	4,000	4,000	
Mohawk Petroleum Co.	Bakersfield	S-C	11,000	9,000	2,000
Palomar Oil & Refining Corp.	Bakersfield	S-L-A	1,300		1,300
Standard Oil Co. of California	Bakersfield	Complete	19,000	19,000	
Sunland Refining Corp.	Bakersfield	S-C	5,352	5,352	
Totals			64,052	55,752	8,300
State totals			1,334,052	1,243,052	89,800

[1] S-C—Skimming and cracking
S-L-A—Skimming, Lube, and Asphalt
Complete—Skimming, Lube, Cracking, and Asphalt

Table 23. Natural gasoline and cycle plants in Kern County as of Jan. 1, 1958. (Data from More, 1958.)

Plants	Location		Daily capacity (1000's of gallons)		
	Field	Nearest town	Natural gasoline	Liquified petroleum gases	Total
Bankline Oil Co.	Midway-Sunset	Maricopa	15	2	17
Belridge Oil Co.	North Belridge	McKittrick	52	13	65
Honolulu Oil Corp.	Cymric	McKittrick (Taft)	20	56	76
Honolulu Oil Corp.	Buena Vista Hills area (Midway-Sunset)	Taft	23	7	30
Ohio Oil Co., Operator	South Coles Levee	Bakersfield (Taft)	[1]42	90	[1]132
Richfield Oil Corp.	North Coles Levee	Tupman (Taft)	120	95	215
Shell Oil Co.	Ten Section	Bakersfield	35	70	105
Standard Oil Co. of Calif.	Midway-Sunset	Taft	85	15	100
Standard Oil Co. of Calif.	Midway-Sunset	Taft	5	--	5
Standard Oil Co. of Calif.	Mountain View	Lamont (Bakersfield)	20	--	20
Standard Oil Co. of Calif.	Lost Hills	Lost Hills	4	--	4
Standard Oil Co. of Calif.	Greeley	Bakersfield	25	39	64
Superior Oil Co.	Rio Bravo	Shafter (Bakersfield)	21	50	71
Union Oil Co. of Calif.	Belgian Anticline	McKittrick	6	--	6
[2]U. S. Naval Reserve, Unit Operation (Standard Oil of Calif., Operator)	Elk Hills	Tupman (Taft)	5	--	5
Western Gulf Oil Co., Operator	Paloma	Bakersfield	[1]218	147	[1]365
Totals			696	584	1,280

[1] Includes cycle condensate capacity.
[2] U.S. Naval Reserve moth-balled plant at Elk Hills not included.

gas, new reserves of liquid hydrocarbons have been less than production in recent years, thus proved reserves have gradually decreased. Table 21 shows the reserves and estimated ultimate production of the giant oil fields in the County.

Processing and Utilization

Before crude oil, natural gas, and natural-gas liquids are ready for consumption, the various products as well as impurities, must be separated or extracted. Crude oil, for example, is treated at refineries (fig. 90) by processes such as catalytic cracking, catalytic reforming, catalytic hydrogenation, alkylation, polymerization and thermal methods. Of the eight refineries in Kern County, six were operating as of January 1, 1958 (see table 22). The principal products obtained from crude oil are gasoline, residual and distillate fuel oils, kerosene, jet fuel, lubricating oil and grease, wax, coke, asphalt, road oil, still gas, and liquefied refinery gases (butanes and propane).

Natural gas is usually processed to remove oil, water, dust, and other impurities, and then is odorized so that leakage can be detected. Nearly all wet gas is treated at natural gasoline plants to extract the valuable natural-gas liquids. The residue gas is then ready for consumption. The principal uses of natural gas are for commercial and residential heating, electric power generation, and as industrial fuel.

Figure 90. Aerial view of Standard Oil Company of California refinery at Oildale. This refinery is the most recently constructed in the county. Kern River oilfield lies in background. *Photograph courtesy Standard Oil Company of California.*

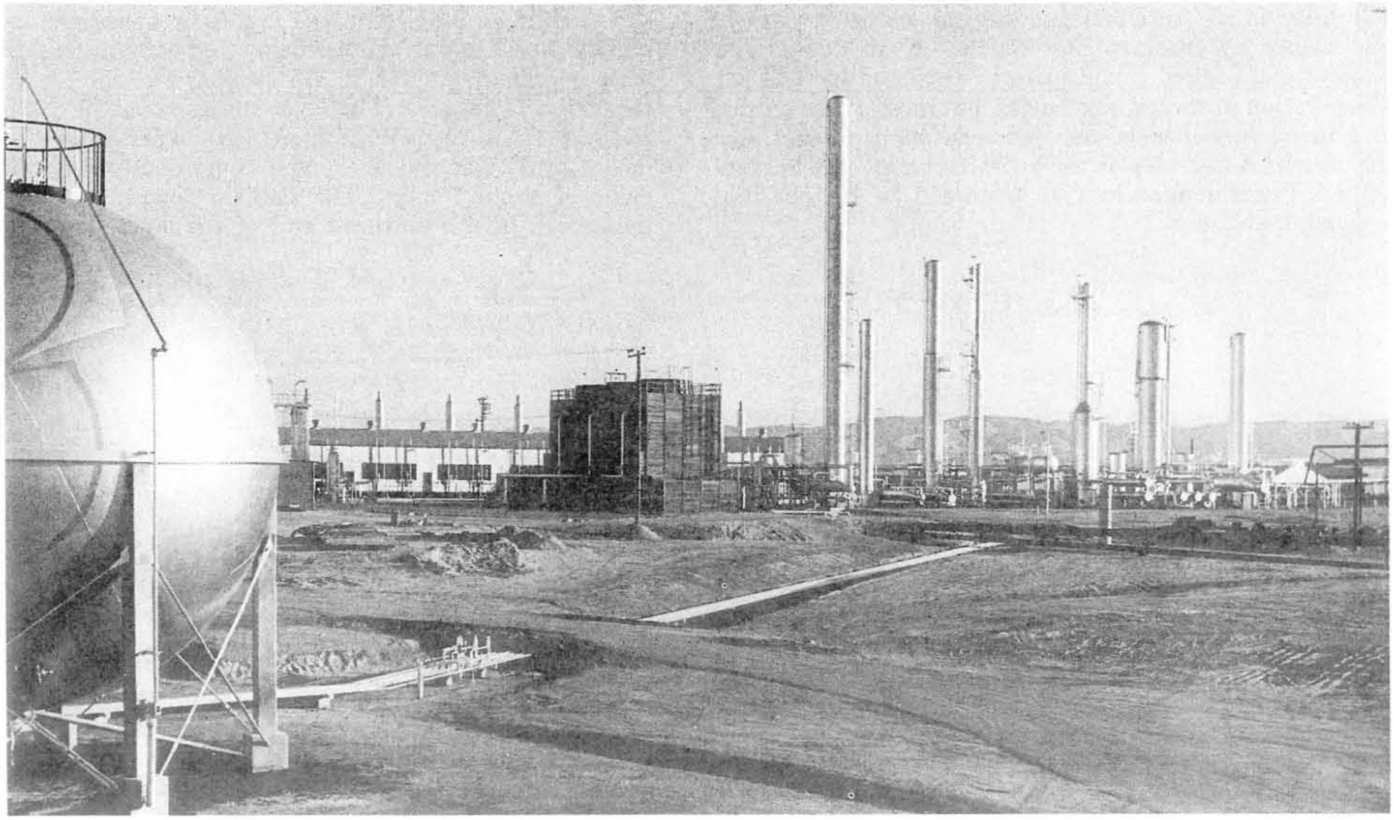


Figure 91. View of part of Standard Oil Company of California natural gasoline plant, Elk Hills field. Absorption, distillation, and fractionating towers are at right; cooling tower is in center; furnaces are in background; and storage tank is at extreme left of photo. *Photograph courtesy Standard Oil Company of California.*

The processing of wet gas to obtain the natural-gas liquids is done at natural gasoline and cycle plants (fig. 91) which are in or near the producing fields. The principal type of gasoline plant employs a compression-oil absorption method. The natural-gas liquids are extracted from the wet gas by absorption in oil, then the gas liquids are removed from the oil by distillation. In later fractionation, the natural-gas liquids are separated into natural gasoline, propane, and butanes. Cycle plants are similar to gasoline plants except for an initial processing step whereby the gas from the condensate reservoir is treated in a series of heat exchangers and separators to remove the heavier fractions of the gas liquids. The resulting product is known as debutanized or cycle condensate. As of January 1, 1958, fourteen natural gasoline and two cycle plants were operating in Kern County (table 23). Almost all of the natural gasoline and condensate is shipped to refineries for catalytic reforming and subsequent blending with refinery gasoline. Much of the LPG is also sent to refineries, but nearly half is used for heating and fuel purposes or sold to chemical and synthetic rubber plants.

Pumice and Pumicite

Approximately 150,000 tons of pumice and pumicite valued at about one million dollars have been mined at a few localities in El Paso Mountains, northeastern Kern County (fig. 85). Two of the deposits—the Calsilco pumice deposit (fig. 92) and the Cudahy pumicite deposit (fig. 93)—have yielded nearly all of the pumice and pumicite mined in the county to date. Other pumice and pumicite deposits in El Paso Mountains, however, contain large reserves of mineable material. In recent years only the Calsilco deposit has been worked.

All of the deposits of these materials in El Paso Mountains are sedimentary layers in the lower half of the Ricardo formation of Pliocene age. They crop out in a nearly continuous northeast-trending belt that extends 7 or 8 miles northeast from the general vicinity of the old site of Redrock, at the mouth of Redrock Canyon, to the south slopes of Black Mountain.

Calsilco (Holly Camp) Pumice Deposit. Location: NE¼ sec. 4, T. 29 S., R. 38 E., M.D.M., northwest side of El Paso Mountains, 10½ miles north-northeast of Cantil, 4 miles east of U. S. Highway 6. Ownership: Calsilco Corporation, H. A. Richardson, president and manager, 5201 Alhambra, Los Angeles 22, owns nine lode claims (1958).

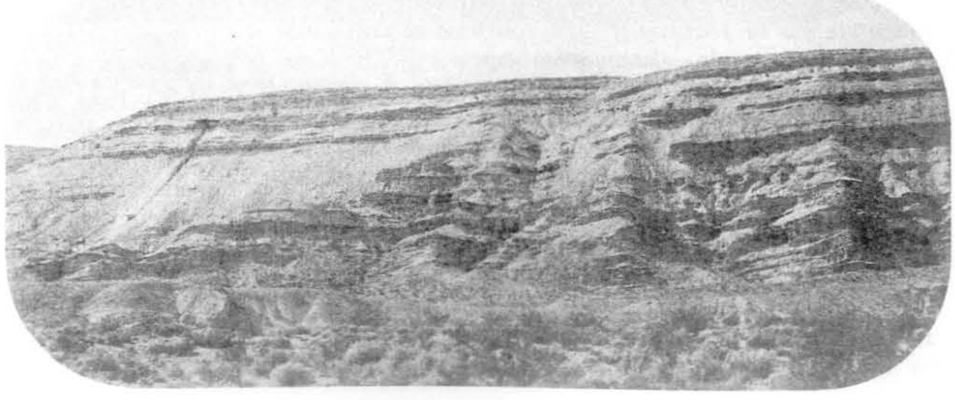
The Calsilco deposit was first worked by an unidentified concern from 1939 to 1945, then briefly by the Insulpum Corporation, and since 1946 by the Calsilco Corporation. Total production is greater than 25,000 tons of raw material. The raw material was being mined inter-

mittently in 1958, milled and bagged on the property, and hauled by truck to Los Angeles or rail siding. The ground and bagged pumice can be prepared by Calsilco Corporation in several size ranges, but most of the output was being furnished in sizes between minus 60 and plus 200 mesh. A minus 600 mesh product can also be furnished. Prices ranged in 1958 from $55 to $85 per ton, bagged, f.o.b. mine.

The Calsilco pumice deposit is a layer of sedimentary pumice lapilli tuff which lies below red andesite agglomerate in Dibblee's (1952, p. 51) member 2 of the Ricardo formation (Pliocene). The layer strikes about N. 20° E. and dips 15° to 30° NW. It ranges in thickness from a few inches to 50 feet and is exposed continuously for a distance of about 7 miles. The Calsilco deposit is about 1 mile south of the northeast end of the layer. Here tuff

Figure 92 (above). View to north of the Calsilco pumice quarry and mill. Pumice layer dips to observer's left.

Figure 93 (below). View to northwest of the Cudahy pumicite deposit. White band of pumicite lies near crest of hill and dips away from observer. Earlier mining operations were in western part of layer at head of tramway in left part of photo. Later mining was in eastern part of layer.



PUMICE AND PUMICITE

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
458	Black Mountain group	Approx. secs. 4, 5, T29S, R38E, and secs. 31, 32, T28S, R38E, MDM, northwest flank of El Paso Mts., 10 miles north-northwest of Cantil	Rolf L. Meuer and others, c/o Della G. Gerbracht, P.O. Box 346, Randsburg (1958)	Pale tan to white pumice in pumicite matrix of member 2 (Dibblee, 1952) of Pliocene Ricardo formation. Pumice layer strikes NE. and dips gently NW. Crops out continuously for about 3,000 feet on Black Mt. and Opal Extension groups. Layer is about 30 feet thick.	Six lode claims and 1 placer claim. An undeveloped prospect. See also Opal Extension group. (Dibblee, Gay 52:50, 63t; Tucker, Sampson, Oakeshott 49:249, 279t).
459	Calsilco (Holly camp) deposit	NE¼ sec. 4, T29S, R38E, MDM, northwest side of El Paso Mts., 10½ miles north-northeast of Cantil, 4 miles east of U.S. Hwy. 6	Calsilco Corp., H. A. Richardson, Pres. and mgr., 5201 Alhambra, Los Angeles, 32 (1958)	Twenty-to 30-foot thick layer of pumice and pumicite in the Ricardo formation.	See text. (Chesterman 56:68, 90t, 96t; Dibblee, Gay 52:51, 64t; Tucker, Sampson, Oakeshott 49:250, 279t).
460	Cudahy silica deposit	SW¼ sec. 5, NW¼ sec. 8, T29S, R38E, MDM, El Paso Mts., 9 miles north-northeast of Cantil near rim of north-west side of Last Chance Cyn.	Purex Corp., Ltd., 9300 Rayo, South Gate (1958)	Pumicite layer in member 4 (Dibblee, 1952) of Ricardo formation (Pliocene).	See text. (Chesterman 56:68, 90t, 97t; Dibblee, Gay 52:53, 64t; Tucker 29:76; Tucker, Sampson, Oakeshott 49:250, 279t).
	Holly camp deposit				See Calsilco deposit in text. (Dibblee, Gay 52:51, 64t; Tucker, Sampson, Oakeshott 49:250, 279t).
	New Joshua prospect				Part of Opal Extension group, which see. (Dibblee, Gay 52:64t).
461	Opal Extension and South Opal (New Joshua) group	Secs. 4, 5, 8, T29S, R38E, MDM, on northwest flank of El Paso Mts., 10 miles north-northeast of Cantil	Della G. Gerbracht and others, P.O. Box 346, Randsburg (1958)	Pale tan to white pumice in pumicite matrix of member 2 (Dibblee, 1952) of Pliocene Ricardo formation. Pumice layer about 30 feet thick and exposed for several hundred feet in southeast face of small ridge. Layer strikes NE. and dips gently NW.	Ten lode claims and 2 placer claims. An undeveloped prospect. A few cubic yards blasted loose but no material sold. See also Black Mountain group. (Dibblee, Gay 52:51, 63t; Tucker, Sampson, Oakeshott 49:250, 279t).
462	Ora No. 1 claim	Approx. center sec. 16, T28S, R38E, MDM, west slope of Black Mt., 14 miles northeast of Cantil	Undetermined, 1958; Ora Hopkins and Fred Bowers, Inyokern (1952)	Gently-west dipping, north-striking layer of pumice-bearing tuff. Deposit is described as small and about 30 feet thick (Dibblee and Gay, 1952, p. 51).	Developed for open pit mining before 1952 but only few cubic yards of material was removed. Idle. (Dibblee, Gay 52:51, 63t).
	Parrott and Allee claims	Reported in sec. 18, T29S, R38E, MDM, El Paso Mts., about 7 miles north of Cantil (1929); not confirmed, 1958	Undetermined, 1958; Frank Allee (1952) (deceased)	Bed of white volcanic ash about 8 feet thick crops out for several thousand feet in northwest part of El Paso Mts. In vicinity of these claims beds strike N. 30° E. and dip 25° NW. into west side of Iron Cyn. Beds underlain by 20 feet of gray volcanic ash and overlain by sandstone.	In 1929, deposit was developed by short adits and open cuts. Tucker (1929, p. 76) reports that 50 tons of white volcanic ash was shipped to Los Angeles in 1926 and utilized in soap and cleanser compounds. Dibblee and Gay (1952, p. 53) report that less than 1,000 tons was sold for use in cleansers and as concrete aggregate. Idle since about 1940. (Dibblee, Gay 52:53, 64t; Tucker 29:76; Tucker, Sampson, Oakeshott 49:279t).
	Pottery group	Reported in sec. 14 (?), T28S, R39E, MDM, about 10 miles south-southeast of Inyokern, on northeast slope of Black Mountains	California Tufa Pozzuolanic Materials Co., H. A. Miller, gen. mgr., 437 No. Sycamore Ave., Los Angeles (1959)	Pale orange-pink tuff-breccia composed of fragments of pumice, perlite, and volcanic glass in matrix of pumicite. Resembles layers in Member 2 of the Ricardo formation (Dibblee, 1952) which ranges in thickness from 0 to 50 feet.	Eight claims (Pottery Nos. 1-8). Owner reports that the rock is suitable for use in pozzuolanic cements and that large quantities are available. No production; idle.
463	Queenie mine	NW. cor. sec. 24, T29S, R37E, MDM, 6½ miles north of Cantil, in tributary cyn. to Redrock Cyn., one mile east of U. S. Hwy. 6	Undetermined, 1958; George J. Colton, 65 E. 52d St., Long Beach 5 (1952)	Deposit consists of a bed of volcanic ash, 4 feet thick, in the Ricardo formation of Plio-Pleistocene age. Bed is pale gray, fine grained, evenly layered and moderately coherent. Crops out as a capping on the southwest tip of a small ridge which trends northeast. Covers area of 200 to 300 square feet at tip of ridge and underlies 10 to 20 feet of overburden in small hill to northeast. Probably covers about 1,000 square feet in the hill. Farther east is exposed as part of NE.-trending, NW.-dipping section of Ricardo formation.	A source of a few hundred tons of volcanic ash for use as an abrasive cleanser (Dibblee and Gay, 1952, p. 53); date undetermined. Mining was along northeast edge of southwestern outcrop where lower 18 inches of bed apparently was selected for shipment. Several hundred tons still exposed on surface as well as much more in deposits to north-east. Idle for several years. (Dibblee, Gay 52:53, 64t).

PUMICE AND PUMICITE, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
464	White Castle deposit	Reported in sec. 32, T28S, R39E, MDM (1949); probably in SW¼ sec. 5, on small hill north slope of El Paso Mts., 8½ miles south of Inyokern	Undetermined, 1958; F. D. Shuck, Glendora (1949)	An exposure of grayish-white pumicite 70 feet thick, 300 feet wide, and 60 feet long. Pumicite is part of Ricardo formation which crops out throughout a large part of the El Paso Mts. The pumicite is overlain by basalt.	Developed by a 50-foot open cut on east slope of small hill a few tens of feet west of a dirt road. Idle. Probably only minor production. (Chesterman 56: 90t, 97t; Tucker, Sampson, Oakeshott 49: 251, 279t).
465	Williams deposit	Reported in sec. 32, T28S, R39E, MDM (1949); probably in sec. 5 or 6, north slope of El Paso Mts., 9 miles south of Inyokern	Undetermined, 1958; Tom Williams, Randsburg (1949)	Pumicite layer about 50 feet thick and 600 feet long southwest of White Castle deposit.	Developed by open cuts before 1949. Probably no production; idle. (Chesterman 56:91t, 97t; Tucker, Sampson, Oakeshott 49:251, 279t).

is from 20 to 30 feet thick and dips 20° NW. into the east side of a small knoll capped by andesite (fig. 92). The tuff consists of white angular fragments of pumice firmly enclosed in a matrix of white pumicite (volcanic ash). The rock contains a small proportion of small grains of glassy quartz, white feldspar, and off-color pumice fragments. The white pumice fragments range in diameter from ⅛-inch to ⅜-inch and make up an estimated 40 percent or more of the rock.

The pumice is blasted from the walls of a discontinuous open pit which in 1958 was about 1,600 feet long, 30 to 50 feet wide, and 15 to 25 feet deep. The pumice is loaded onto dump trucks with a ¾-cubic yard power shovel and hauled a few hundred feet to the plant where it is passed through a closed circuit consisting of a hammer mill, roller, mill, screens, and cyclone collectors. The finished products have been used in insulating and acoustical plaster, cleansing compounds, wood and paint fillers, toothpastes and powders, soil conditioners, and oil-absorbing compounds. In 1958, most of the finished material was sold for use as paint filler and oil-absorbing compounds.

Previous to the present method of mining from an open pit the pumice was mined from several underground chambers mostly now engulfed in the northernmost part of the open pit. The western part of the chambers are approximately 15 feet wide, about 15 feet apart, and are in the west wall of the open pit.

Cudahy Pumicite Deposit. Location: SW¼ sec. 5 and NW¼ sec. 8, T. 29 S., R. 38 E., M.D.M., El Paso Mountains, 9 miles north-northeast of Cantil, near the rim of the northwest side of Last Chance Canyon. Ownership: Purex Corporation, Limited, 9300 Rayo St., South Gate, owns several claims (1958).

The Cudahy pumicite deposit has been the source of about 120,000 tons of pumicite mined continuosly by the Cudahy Packing Company during the 24-year interval 1923-47. The mined material was hauled in large side-dumping ore cars pulled by burros to the head of an inclined rail-tramway 475 feet long. The ore was lowered to loading bins at the bottom of the tramway from which it was hauled in trucks to Ceneda Siding on the Southern Pacific Railroad, about 7 miles due south of the mine. From there the ore was taken to a plant in the Los Angeles area where it was ground and utilized as an abrasive ingredient in Old Dutch Cleanser. The mine has been idle since 1947, and nearly all of the mining machinery was removed from the mine in 1958.

The Cudahy deposit is in the thickest and uppermost of six layers of white, thin-bedded, fine-grained, pumicite. The pumicite is interstratified with various other pale-colored sedimentary rocks (fig. 93) which comprise member 4 of the Pliocene Ricardo formation; its dip is 15°-20° NW. (Dibblee and Gay, 1952, p. 53). The uppermost layer is 9 feet thick at the mine site and for several hundred feet northeast and southwest of the mine. Elsewhere it is less than 9 feet thick and the whole of member 4, which is a maximum of 600 feet thick southwest of the mine, pinches out about 1½ miles northeast of the mine. The 9-foot layer of pumicite crops out a few tens of feet below and nearly parallel to the sharp southeast crest of a northeast-trending ridge. The other five layers of pumicite crop out prominently lower on the southeast slope of the ridge.

The mine consists of two groups of workings, the haulage portals of which are a few hundred feet apart. The workings extend a few hundred feet into the cliff to remove pumicite from an area several hundred yards long. The earliest mining was from a gently inclined shaft extended north-northwest down the dip of the pumicite from a point a few feet north of the head of the tramway. Lateral drifts and random rooms were extended a few tens of feet southwest and northeast from the shaft. Less than half of the pumicite was left in pillars between rooms. Pumicite was later mined from the workings a few hundred feet northeast of the tramway. At this site a 200-foot crosscut adit was driven north to intersect the pumicite layer. From the intersection a

double-width haulage level was extended several hundred feet northeast in the pumicite layer. Several raises about 150 feet long and about 100 feet apart were extended up-dip to the surface from the northeastern half of the haulage level. Lateral rooms were developed between the raises and about half of the pumicite between the haulage level and the surface was removed.

Quartz and Feldspar

By William E. Ver Planck

Quartz and feldspar are considered together because they are closely associated in many deposits. Small quantities of both minerals have been produced intermittently for many years in Kern County, mostly from the Rosamond pegmatite. Quartz is a low-cost commodity that is of economic value only if it is of high quality. That produced in Kern County has been used as an inert mineral filler or extender, for ceramic glazes, and as an exposed aggregate in precast concrete facings for buildings. At one time relatively large quantities of feldspar were used as a source of alumina in glass for containers and as an ingredient of ceramic bodies, but both markets have shrunk in California. Now alumina for glass is obtained from feldspathic sand, and talc has largely replaced feldspar in the manufacture of wall tile.

Quartz and feldspar are obtained commercially from certain pegmatites that contain masses of quartz and feldspar large enough to mine separately. Both minerals commonly are recovered from the same deposit. Some closely related bodies that consist of quartz only or quartz with only small proportions of feldspar and mica are commercial sources. Quartz for most purposes cannot be obtained from metalliferous veins because of the presence of deleterious minerals, especially pyrite. In Kern County, quartz-feldspar pegmatites and quartz veins are found in granitic areas in the Mojave Desert and the Sierra Nevada.

Rosamond (Rosamond Feldspar, Rosamond Feldspar and Silica, Townsend Feldspar and Silica) Mine. Loca-

QUARTZ AND FELDSPAR

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Burris & Grant deposit	Undetermined: possibly Rosamond pegmatite, which see	George J. Burris and Edwin J. Grant, Rosamond (1920)	Quartz-feldspar pegmatite.	Small production of quartz and feldspar, 1916. Trial shipment of feldspar to a portland cement plant for by-product recovery of potash, 1917. No recorded production after 1917.
	Chamberlain silica deposit	Undetermined: possibly Rosamond pegmatite, which see	Chamberlain Co., Rosamond (1922)		Small production of quartz, 1916. Company reported in 1923 that the property had been abandoned.
466	Great White Way deposit	Approx. NW¼ sec. 16, T27S, R36E, MDM, Sierra Nevada, 5 3/4 miles southeast of Weldon	John W. Nicoll, Weldon; leased to Exploration & Development Associates, P.O. Box 936, Los Altos (1957)	Quartz deposit reported to assay 99.3 percent SiO_2 and 0.06 percent "iron".	Development approx. 1957. No record of production. Difficult access.
	Knecht	Undetermined	Louis C. Knecht, Tehachapi (1920)		Development approx. 1915-1920. No recorded production.
	Lange mine	Undetermined	A. H. Lange, P.O. Box 194, Tehachapi (1941)		Reported production of a substantial tonnage of quartz (quartzite-?) for use in the manufacture of sulfate-resistant cement.
467	Pala Ranch deposit	NE¼ sec. 25, T25S, R32E, MDM, Greenhorn tungsten area, 4 miles southwest of new Kernville, above Cane Creek	Undetermined, 1958; probably Pala Ranches, Earl Pascoe, Wofford Heights (1958)	Dike-like quartz vein 50 to 75 feet in diameter. Composed of very pure white quartz. Very weak iron oxide staining in minute fractures. The quartz exhibits unusual cleavage in three directions which are consistent over the exposed parts of the vein.	This property has never been developed and no roads to it exist.
468	Rosamond (Rosamond feldspar, Rosamond feldspar and silica, N.W. Sweetser, Townsend feldspar and silica) mine	NW¼ sec. 6, T9N, R12W, SBM, 2 miles northwest of Rosamond	N. W. Sweetser, P.O. Box 445, Rosamond; leased to Frank Ogle and R. B. Baines, Rosamond (1957)	Orthoclase and clear white quartz in east trending pegmatite dike in quartz monzonite.	See text. (Julihn, Horton 37:41; Sampson, Tucker 31:416; Simpson 34:411; Tucker 29:65; Tucker, Sampson, Oakeshott 49:246).
	Rosamond feldspar mine				See Rosamond (Julihn, Horton 37:41; Tucker, Sampson, Oakeshott 49:246).
	Rosamond feldspar and silica mine				See Rosamond (Sampson, Tucker 31:416).
	N. W. Sweetser mine				See Rosamond.
	Townsend feldspar and silica mine				See Rosamond (Simpson 34:411; Tucker 29:65).

tion: NW¼ sec. 6, T. 9 N., R. 12 W., S.B.M., 2 miles northwest of Rosamond. Owner: N. W. Sweetser, P.O. Box 445, Rosamond; leased to Frank Ogle and R. B. Baines, Rosamond (1957).

The Rosamond pegmatite has yielded small tonnages of quartz and feldspar intermittently for many years. N. W. Sweetser recalls (personal communication, 1957) that before he acquired the deposit about 1925, some one else had attempted to produce quartz from it. Sweetser developed the pegmatite for its feldspar; and from 1927 to 1931 the deposit yielded 2,500 tons of feldspar (Julihn and Horton, 1937, p. 41), which was sold to the glass industry through the Los Angeles Chemical Company. Following the contraction of the feldspar market, caused in part by the use of feldspathic sand in glass batches, the deposit was idle. Since 1947, it has yielded crushed quartz for use in a patented concrete product for the facing of buildings.

The deposit consists of a body of quartz-feldspar pegmatite, ovoid in plan, in Mesozoic quartz monzonite. The long axis of the outcrop, which measures 300 feet by 150 feet, trends northwest; and the body dips 60°-70° SW. The footwall of the pegmatite is a fault or fault zone, but the hanging wall is not faulted. The body is composed mostly of pink orthoclase feldspar and quartz. In general the quartz and feldspar are in separate bodies with as much as 3 inches of biotite along their boundaries. The quartz is in plunging shoots 10 to 15 feet wide. Near the hanging wall of the pegmatite some of the quartz is mixed with kaolinized feldspar. Minor faults, in addition to the footwall fault, have been found; and the body has abundant cracks that contain clay films.

Some quartz and feldspar were mined from the outcrop, but the principal work has been done from a 75-foot vertical shaft that bottoms in the footwall near the east end of the body. On the 70-foot level a drift follows the footwall westward, and a crosscut extends from the vicinity of the shaft toward the hanging wall. At least two stopes were driven in feldspar; the one that extends from the crosscut to the surface now provides the usual means of access to the underground workings. The following analysis is typical of the feldspar shipped (Sampson and Tucker, 1931, p. 417).

SiO_2	69.85
Al_2O_3	16.34
Fe_2O_3	0.12
MgO	0.10
CaO	1.83
K_2O	9.13
Na_2O	2.31
TiO_2	trace
Cl	none
SO_3	none
	99.68

Early in 1957, quartz was being mined from a stope off the footwall drift. Tungsten-carbide-tipped drills are used to make blast holes. Muck from the stope is drawn from a chute into a sinking bucket, which is carried on a rail-mounted dolly to the shaft for hoisting. The owner believes that the reserves of quartz on the 70-foot level are substantial. No deeper development has been undertaken.

Practically all of the quartz produced since 1947 has been used by the C. D. Wailes Company, Sun Valley, as an exposed aggregate for concrete facing slabs. Quartz from the Rosamond pegmatite is valued for this purpose because of its slightly brownish color, the presence of reflecting faces, and its tendency to break into rectangular particles. The quartz is sized at the mine to minus ⅝-inch, plus ¼-inch with a jaw crusher and trommel screen. Oversize is recrushed with a hammer mill rather than the jaw crusher because the owner believes that hammer milling tends to yield a greater proportion of particles of the required shape than the jaw crusher.

Quicksilver (see Mercury)

Rare Earth Elements (see Thorium and Rare Earth Elements)

Roofing Granule Material

By Thomas E. Gay, Jr.

In 1957, about 15,000 short tons of crushed and broken stone valued at about $160,000 was produced at several localities in Kern County (fig. 94). This was used mostly as roofing granules. A small tonnage was used as exposed aggregate in building blocks. The principal material mined through 1958 was light-colored Tertiary volcanic rock obtained from quarries near Rosamond, Monolith, and Mojave. Jawbone Canyon has also been the source of volcanic rock.

Roofing granules, which are particles of rock placed on top of felt and asphalt built-up roofs to protect the roofs from the sun's rays, are commonly sized from three-fourths to one-eighth inch diameter, but shadow rock as large as 4 inches has been used for artistic effect. Physical specifications of rocks are not stringent. Granules must be dry and free of fines and dust so they will stick well to hot asphalt. The granules must be hard enough to resist breaking and becoming dusty during handling and transportation. Angular particles are preferable to rounded ones because they adjoin with a minimum of intervening space and the irregular broken surfaces adhere better to the asphalt. An even distribution of sizes throughout the size range of regular granules (¼-inch to ¾-inch) is best for optimum coverage. Opaque granules best protect the asphalt from the sun's rays which appear to cause the asphalt to deteriorate. Many substances which fit these requirements, such as dolomite, broken brick, sewer pipe, and wall tile, have been crushed and used for roofing granules. Screened gravels and crushed gravel have been used also. Natural rock has been steadily increasing in popularity since 1950 because of the subdued pleasing colors available, the low cost of the crushed rock, and the widespread availability of most of the popular colors.

Colored volcanic rocks from several parts of Kern County have been produced at a steady rate since 1950.

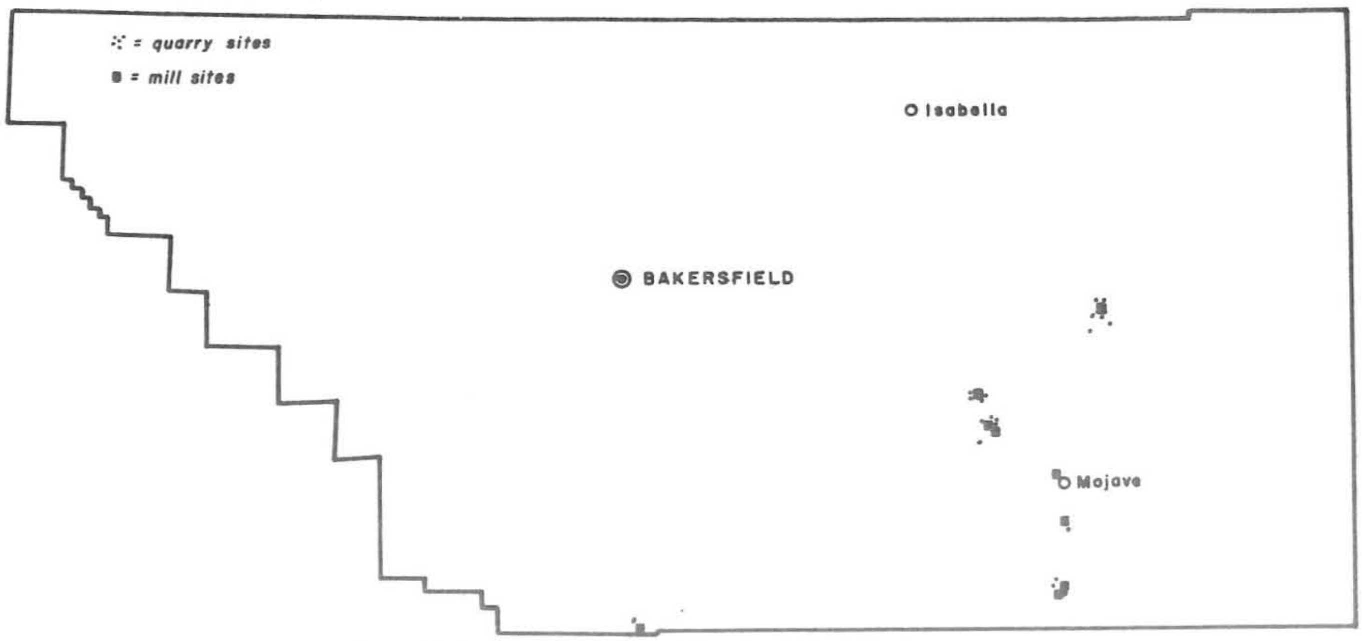


Figure 94. Distribution of roofing granule quarries and mill in Kern County.

Kern County sources have yielded a significant proportion of the roofing granules produced in California since 1950, although no white carbonate granules, one of the most popular types, have been regularly mined from Kern County sources. Green tuffaceous rocks and granitic rocks from Jawbone Canyon, pink volcanic rocks from the hills north of Rosamond, and green, blue, and brown tuffaceous and granitic rocks from Sand and Horse Canyons, east of Tehachapi, were used by various producers. Competition in the industry is keen, both in selling price (commonly $13.50 to $16.50 per ton, f.o.b. mill, bagged) and in variety of colors offered. Most of the Kern County output is marketed in the Los Angeles area, but considerable tonnage is shipped to markets in northern and central California. Some of the quartz mined from pegmatite by Nelson Sweetzer at Rosamond has been utilized as exposed aggregate in building blocks (see *Quartz and Feldspar* section).

Desert Rock Milling Company Quarries. Location: One mill just north of Rosamond, and one (inactive) in Horse Canyon, northeast of Monolith; quarries near the mills. Ownership: William Blair, 650 Clover Street, Los Angeles owns the company; quarry and mill sites partly owned as claims, partly leased (1959).

In 1950, the Desert Rock Milling Company started to produce roofing granules from natural-colored rock in Kern County, and in 1955 was one of the principal producers of granules in southern California. The mill in Horse Canyon has been idle several years, but in 1955 the mill at Rosamond was redesigned and its capacity enlarged. Desert Rock Milling Company produces three colors of granules—"desert rose", "surf green", and "bronze".

The Rosamond mill is in secs. 8 and 9, T. 9 N., R. 12 W., S.B.M., 200 yards west of U. S. Highway 6, 1¼ miles north of Rosamond. In this mill, quarry rock passes through a grizzly to a 12- by 22-inch jaw crusher and is then lifted on a bucket elevator to a double-deck vibrating screen which has openings of $\frac{7}{16}$ inch and ⅛ inch. The plus $\frac{7}{16}$-inch material goes to a 22- by 14-inch roll crusher and is re-screened; the fines (minus ⅛ inch) are discarded; the middling ($\frac{7}{16}$ inch to ⅛ inch) is bagged for sale. Medium sized (1 inch to $\frac{7}{16}$ inch) and large sized (2 inch to 1 inch) granules are also produced, but in lesser tonnages. Different screen sizes and crusher settings are used to obtain the larger granules. About 15 men were employed to operate the mill, quarries, and trucks in 1955.

The Horse Canyon mill is in sec. 15, T. 32 S., R. 34 W., M.D.M., just west of the junction of Cache Creek (Horse Canyon) with Sand Creek, about 8½ miles east of Tehachapi. It is similar to the Rosamond mill. It was built in 1950 and operated for several years, but it was inoperative in February 1955.

"Desert Rose" granules are made from pink, banded rhyolitic tuffs and flows of the Miocene Rosamond formation. The quarry is on the land of N. W. Sweetser, on the west side of a low hill about 1½ miles northwest of the Rosamond mill. Flow-banding and bedding strike about N. 20° W. and dip 45° NE. Similar rock crops out extensively on several hills in the vicinity.

Drilled and blasted rock is loaded on trucks by front-end loader for the 2-mile haul to the mill. In February

1955, the quarry was about 200 feet long, 90 feet wide, and as much as 25 feet deep.

"Bronze" granules are made from a yellow- and red-stained granitic rock which is quarried in sec. 28, T. 32 S., R. 34 W., M.D.M. The quarry is at the east base of an isolated hill a quarter of a mile north of U. S. Highway 466 on the Sand Canyon Road and about 7 miles east of Tehachapi. Although the granite is nearly free of ferromagnesian mineral grains, it is abundantly stained with iron oxides in concentric patterns that are related to fracturing. In 1955, the southerly pit extended about 50 feet into the hill, was 25 feet wide, and as deep as 40 feet at the face. A larger pit, 150 yards to the north, was about 80 feet into the hill, 35 feet wide, and as deep as 50 feet at the back. Similar rock is exposed in the rest of the hill. Truck haul to the Rosamond mill is about 23 miles.

"Surf green" granules are made from tuffaceous sandstone of the Miocene Bopesta formation, quarried in sec. 15, T. 32 S., R. 34 W., M.D.M., about 250 yards northeast of the company's mill in Horse Canyon. Beds rich in pea-sized angular fragments of siliceous red volcanic rocks and green pieces of chloritic shale are distinctive. Bedding strikes about N. 50° E. and dips 40° NW. Portions of the exposed rock are disrupted by both north- and east-trending faults. The main pit is T-shaped, and extends through a narrow entrance about 60 feet into the hill. It is about 125 feet in maximum width and as deep as 70 feet at the face. Nearly adjacent to the north edge is a smaller pit cut about 80 feet into the hill, 30 feet wide, and 25 feet in maximum depth. Much of the hill is composed of the same formation. Blasted rock is loaded in trucks by front-end loader for a haul of about 26 miles to the Rosamond mill.

Groover Mining and Milling Company Quarries. Location: Mill in sec. 14, T. 30 S., R. 36 E., M.D.M., at Blue Point in Jawbone Canyon; quarries in nearby sections. Ownership: Steven G. Groover, 4730 Valley Blvd., Los Angeles 32, owned the mill and quarries on claims and leased land until July 1959 when the mill and quarries were purchased by Harrison L. Daves Mining Co., P.O. Box 15, Cantíl.

Groover Mining and Milling Company erected a mill (fig. 95) and commenced to produce natural-colored roofing granules in mid-1953, and produced as much as 500 tons of granules a month until about mid-1957. Granules were produced in four colors, "emerald green", "seafoam green", "rose bronze", and "vintage red" all from rocks obtained in Jawbone Canyon within 2 miles of the mill. The plant was inactive in 1958 and until July 1959 when Daves Mining Co. reopened the mill.

When the plant is in operation, quarried rock is trucked to the mill, crushed in a jaw crusher, then separated on a vibrating double-deck screen with ½-inch top screen openings and ⅛-inch bottom screen openings. Material larger than the top screen openings is crushed in a roll crusher and re-screened. Material smaller than the bottom screen is discarded. Material between the two

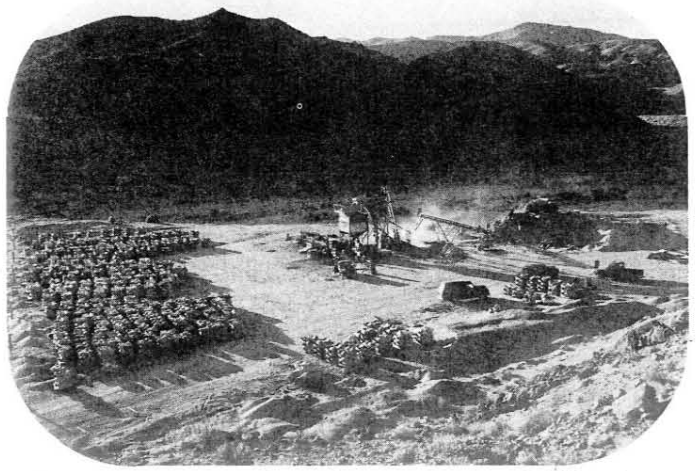


Figure 95. View to northwest of Groover Mining and Milling Company roofing granule mill. Sacked material is stored on pallets for transfer to trucks. Principal quarry lies behind observer. *Photograph by Thomas E. Gay, Jr.*

sizes is the desired regular grind granule, and is sacked, 80 pounds to the bag, for sale. Oversize granules, in the size-range 2 inches to 1¼ inches, are produced by widening the jaw crusher setting, changing screen sizes, and by-passing the roll crusher. About five men are employed at the quarries and mill when it is operated at full scale.

"Emerald green" granules are made from Tertiary quartz latite and rhyolite tuff-breccia obtained in section 14 on the northwest edge of Blue Point hill about half a mile north of the mill. The bench was about 60 feet long, 20 to 30 feet wide, and had walls a maximum of 30 feet high in 1957.

The "seafoam green" source rock is pale green compact Tertiary rhyolite tuff-breccia with abundant red to brownish red angular siliceous inclusions. It is mined at the southern tip of Blue Point hill, several hundred feet east of the mill, from three benches, each about 40 feet into the hill, 30 to 60 feet wide, and about 50 feet deep at the back in 1957.

"Vintage red" granules are made from a purplish-red-stained Mesozoic biotite granodiorite quarried in a gully bottom about half a mile southeast of the mill in the northeast corner of section 23. Although deeply discolored, the granodiorite is not perceptibly disintegrated by weathering. By 1957, less than 100 tons of rock had been removed from steep walls of outcrops and no pit had been developed.

"Rose bronze" granules are crushed from Mesozoic granodiorite containing abundant salmon-colored orthoclase crystals, quarried about 2 miles southwest of the mill in section 28, just east of Jawbone Well. This rock is less stained and more fractured than that in the vintage red quarry. In 1957 the quarry was about 70 feet long, 40 feet wide, and as much as 30 feet deep at the face.

In 1957, the "seafoam green" outcrops in Blue Point hill were evaluated as possible sources of large blocks

from which cut and polished dimension stone could be obtained. Unpublished reports of examinations by V. M. Arciniega and C. A. Lee indicate that blocks at least as large as 5 feet by 6 feet by 9 feet could be obtained by judicious quarrying from parts of the faces exposed in the present quarries. These quarries are in the southern part of a ridge in which pale green rhyolite tuff-breccia crops out continuously for approximately a quarter of a mile and is about 100 feet thick. Waste material from the quarries would be suitable for rubble, ashlar, and roofing granules. No large blocks had been quarried by mid-1957.

Hidecker Rock Company. Location: Two grinding mills, one near Rosamond and one in Horse Canyon near Tehachapi; several small quarries near the mills. The Rosamond mill is in secs. 7 and 8, T. 9 N., R. 12 W., S.B.M., about 300 yards west of U.S. Highway 6, about 1½ miles north of Rosamond. The Horse Canyon mill is in the NW¼ sec. 14, T. 32 S., R. 34 E., M.D.M., on the east bank of Cache Creek. It is about half a mile north of its juncture with Sand Creek, and about 8 miles east-northeast of Tehachapi. Ownership: Hidecker Brick Company, Gerald R. Hidecker, president, 800 N. Mission Road, Los Angeles, owns the mills; quarry sites are leased from various owners (1958).

Hidecker Brick Company, continuously active since 1913, is by far the oldest producer of roofing granules in the southern California area. In 1950 the company built two new mills in Kern County. Since then these have had a combined yearly production of about 10,000 tons of naturally colored granules. A dozen or more differently colored rocks are quarried at various sites near the two mills. A large proportion of the granule output is sold in the Los Angeles area, but most of it is shipped to northern California and neighboring states.

The regular size of granules is between ¾- and ¼-inch diameter; larger granules, 2 inches in maximum diameter are sold, and a few special orders of 3-inch and 4-inch fragments (shadow rock) have been marketed.

Both mills contain similar machinery. The mill in Horse Canyon has a slightly greater capacity than the one near Rosamond. Broken rock is passed through a grizzly to a jaw crusher, set at about 2 inches for regular size granules. Crushed rock goes over a double-deck vibrating screen, with ¾- and ¼-inch screen openings. The middling product (¾ inch to ¼ inch) is the regular size roofing granule and is sacked for shipment. Oversize (plus 1 inch) is recrushed in a secondary roll crusher, and returned to the screen. To obtain granules 2 inches in diameter or larger the jaw crusher is set wider, screen sizes are changed, and the oversize product is sacked for sale instead of being recrushed. Three to four men are usually employed at each mill.

Quarries yielding some of the colored rocks most in demand in 1955 are briefly described below. Several other rocks are quarried and milled intermittently according to market requirements.

A pale pink, banded rock marketed as "Desert Pink" is obtained in the principal quarry immediately east of the Rosamond mill. Miocene rhyolite flows and tuffs strike N. 25° W. and dip 60°-80° E. and crop out for a square mile or more in the vicinity. The rock for roofing granule manufacture is obtained from a side-hill quarry which early in 1955 was 150 feet long, 50 feet wide, and as deep as 35 feet. Drilled and blasted rock is loaded by hand on a mine car and trammed about 75 yards maximum to the mill. Overburden averages less than 2 feet in depth, and is removed with a bulldozer.

"Mojave Rose", which is deeper red than Desert Pink, is found in a silicified zone of the Rosamond formation and is exposed about 150 yards north of the Desert Pink quarry. The Mojave Rose outcrop, as exposed in February 1955, was about 150 feet long, and as wide as 30 feet. Less than 50 tons of it had been removed by hand methods from a shallow open cut and hauled by truck to the mill.

Yellow, white, pale green, and lavender rocks are obtined in minor quantities from nearby tuffaceous rocks. Less than 100 tons of each had been removed in early 1955 from pits no larger than 25 feet square and 5 feet deep. All were quarried by hand methods and trucked to the mill.

Yellow granules are obtained from porous rock quarried about half a mile north of the mill. White granules are obtained from kaolinized rock obtained about 250 yards southwest of the mill. Pale green granules are obtained from rock quarried about a third of a mile south of the mill. Lavender granules are made from rocks exposed in bold outcrops about a third of a mile southwest of the mill.

"Sea Green" rock is obtained from the main pit at Horse Canyon just northeast of the mill. Here well-bedded green tuffaceous sandstone and massive tuff with abundant rock fragments strike N. 75° E. and dip 35° NW. The rocks are part of the Miocene Bopesta formation. The quarry is on the side of a hill at the edge of the valley floor and, in February 1955 was about 150 feet wide, 100 feet into the hill, and as much as 100 feet deep. Blasted rock is loaded on dump trucks by skip-loader for the 250-yard haul to the mill.

"Blue-green" granules are made from rock quarried on the west bank of Cache Creek about half a mile north of the mill, in sec. 11, T. 32 S., R. 34 E., M.D.M. Three side-hill pits about 200 feet apart have been started in an exposure of coarse-grained sandy tuff, 10 to 20 feet thick, and several hundred yards long. The tuff strikes N. 15° E., and dips 30° W. The largest pit is about 25 feet long, 15 feet wide, and 20 feet deep.

"Eggplant" granules are obtained from an outcrop of deep purple vesicular, brecciated volcanic flow rock about a third of a mile north of the mill, on the northwest side of Cache Creek. The outcrop of the rock strikes northeast and dips moderately northwest; it is as much as 100 feet thick and at least a half mile in strike length. Less than 50 tons had been mined in early 1955.

"Cocoa brown" granules have been made from a stratified volcanic sedimentary rock exposed about 3¼ miles

northwest of the mill in sec. 32, T. 31 S., R. 34 W., M.D.M. Bedding strikes N. 80, W. and dips 25° S. Rock was obtained from an open cut about 70 feet long, 5 to 10 feet wide, and 3 feet deep. The brown colored layer is 5 to 10 feet thick and traceable for at least 100 yards in an area where an overburden several feet thick has been removed. Less than 50 tons had been mined in early 1955.

Varicolored chalcedony that caps a hill about half a mile north of the cocoa brown quarry was the source of a small quantity of "agate" granules in early 1955.

Reserves of suitable rock at the various quarries have not been calculated because of unpredictable variations in color which may make rock from adjacent parts of the same bed undesirable.

M and M Mining Company Deposits. Location: Mill in sec. 33, T. 31 S., R. 34 W., M.D.M., in upper Sand Canyon 8 miles northeast of Tehachapi; quarries in secs. 32, 33, and 34. Ownership: Walter C. Eisenman, P.O. Box 1183, Tehachapi, and Tom Murray, Los Angeles, own company, mill site, and several quarry sites; other quarries are leased. The property comprises 160 acres and is held as an association placer claim (1958).

M and M Mining Co. began producing small quantities of natural-colored granules in the summer of 1954 and were active in 1958. The mill is relatively small and cannot be operated in wet weather when quarry roads become impassable.

The mill has the standard flowsheet for roofing granule plants: trucks dump mined rock on a grizzly; the rock is then crushed in a jaw crusher and screened. Oversize pieces are recrushed in a roll crusher; undersize particles are discarded. Granules of ¾- to ⅛-inch size are sacked for sale. The granules produced are designated "robin egg blue", "blue-green", and "cocoa brown" by the producer. The mill has a capacity of about 25 tons per day.

"Robin egg blue" granules are made from a pale blue tuff bed in the Kinnick formation, quarried in section 34, about three-quarters of a mile by road southeast of the mill. The exposure of desirable rock is about 25 feet thick, 50 feet wide, and about 200 feet long; bedding strikes N. 70° W. and dips 30° S. White brecciated tuff, which is in a 14-inch-thick bed, within the blue rock, must be avoided or discarded. The pit is about 40 feet long, 30 feet wide, and as deep as 25 feet at the face.

"Blue-green" granules are obtained from a quarry site in deeply colored, well-bedded sandstone in a sequence of tuffs of the Kinnick formation, about half a mile southeast of the mill in section 33. The sandstone layer strikes N. 70° E. dips about 15° S. and has a dipslope exposure several acres in extent from the crest to the south flank of a small hill. The most desirable colored rock occupies a stratigraphic thickness of about 5 to 8 feet. Two to 3 feet of those strata are well bedded and were probably a source of dimension stone in the past. The operators plan to produce dimension stone from this unit and crush the trimmings for roofing granules. Bulldozer cuts about 10 feet deep, 25 feet wide, and 400 feet long exposed the blue-green sandstone in 1958; the dipslope was largely stripped of overburden. Distance to the mill is more than 2 miles by road.

"Cocoa brown" granules were made from rock obtained in the small quarry in section 32, described under Hidecker Brick Company, above. The blue, blue-green, and cocoa brown material is valued at $16 per ton bagged at the mine.

Mojave Mineral Products Company Deposits. Location: Mill is in northwest part of Mojave; several quarries in Jawbone Canyon, secs. 10, 11, 14, and 15, T. 30 S., R. 36 E., M.D.M. Ownership: I. Blum, Chase Hotel, 1725 Ocean Front, Santa Monica, owner; Henry Krch and Al Smith, Box 2028, Mojave were the operators in February 1955; quarries were leased from various owners. The plant and deposits were leased in 1959 to Cal-Minerals (see tabulated list).

Late in 1952, the Mojave Mineral Products Company commenced producing natural colored roofing granules in the revamped Union Smelter Company mill. Small, intermittent production, with several changes of operators followed until mid-1954. Early in 1955, the mill was reactivated, after additions and rearrangement of machinery brought its capacity to 40 tons per day, and an undetermined output ensued. No production is credited to the company since 1955.

Quarry material, trucked about 24 miles from Jawbone Canyon to the mill, was dumped on a grizzly and passed through a 10- by 20-inch jaw crusher. Salable material (about ¾- to ⅛-inch in diameter) was screened out for sacking; fines were discarded, and oversize material was crushed in a secondary jaw crusher. A second vibrating screen removed salable sizes for sacking; oversize material from this screen was crushed in a roll crusher and returned to the screen; and fines were discarded.

Granules were produced in six colors: light green, blue-green, purple, bronze, pink, and blue. All quarries were in Tertiary volcanic rocks and tuffaceous sedimentary rock exposed just north of Blue Point, Jawbone Canyon. Dolomitic marble from Piute Peak was tested as a possible source of white granules but was not used. The quarries are small, and none has yielded more than a few tons of rock.

Mojave Rock Products Company Deposits. Location: Mill in sec. 5, T. 10 N., R. 12 W., S.B.M., 0.7 mile west of U.S. Highway 6 on Silver Queen Road, 5 miles south of Mojave; quarries in Jawbone Canyon, upper Sand Canyon, and hills north of Rosamond. Ownership: Louis Sherman, 9452 E. Garvey, El Monte, and Harry Field, 2656 Lashbrook, South El Monte are principals in the company; millsite owned by company; quarry sites are leased (1958).

The mill, which is of modern design and large capacity, was put in operation in January 1955, to produce colored roofing granules. Rock is hauled 9 to 30 miles to the mill from deposits north and south of the mill site where electric power is available.

ROOFING GRANULE MATERIAL

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Cal-Minerals		Harvey Schian and A. A. Smith, 3419 Douglas, Mojave, leasing holdings of Mojave Minerals Products Co. (1959)	Granule material from Tertiary sedimentary and volcanic rocks near Blue Point in Jawbone Cyn.; Pre-Tertiary limestone from Miller tungsten prospect 8 miles north of Mojave; Tertiary volcanic rocks at Middle Butte 8 miles southwest of Mojave.	See Mojave Minerals Products Co. in text. No production by May, 1959.
469	Desert Rock Milling Co.	Mill and quarry in secs. 8, 9, T9N, R12W, SBM, 1¼ miles north of Rosamond. Another mill in sec. 15, T32S, R14W, MDM, 8½ miles east of Tehachapi	Desert Rock Milling Co., 650 Clover, Los Angeles (1958)	Granule material obtained from several sources.	See text.
470	Groover Mining and Milling Co.	Center south edge sec. 14, T30S, R36E, MDM, in Jawbone Cyn., 5½ miles northwest of Cinco	Steven G. Groover, 4730 Valley Blvd., Los Angeles 32 (1958)	Tertiary welded tuff breccia and Mesozoic intrusive rocks.	See text. Inactive, 1958.
471	Hidecker Rock Co.	Mill and quarry in secs. 7, 8, T9N, R12W, SBM, 1½ miles north of Rosamond. Another mill and quarries in vicinity of secs. 11, 14, T32S, R34E, MDM, 8 miles east-northeast of Tehachapi	Hidecker Rock Co., 4054 N. Mission Rd., Los Angeles (1958)		See text.
	Last Chance Mine				See Star Dolomite deposit.
472	M and M Mining Co.	Mill in sec. 33, T31S, R14W, MDM, 8 miles northeast of Tehachapi in upper Sand Canyon. Quarries in secs. 32, 33, and 34	Walter C. Eisenman, P.O. Box 1183, Tehachapi; Tom Murray, Los Angeles (1958)		See text.
473	Mojave Minerals Products Co.	Approx. sec. 14, T30S, R36E, MDM, Jawbone Cyn., 5½ miles northwest of Cinco	I. Blum, Chase Hotel, 1725 Ocean Front, Santa Monica (1955)	Tertiary sedimentary and volcanic rocks from localities north of Blue Point used for roofing granules.	See text.
474	Mojave Rock Products Co.	Mill is in sec. 5, T10N, R12W, SBM, 5 miles south of Mojave. Two quarries in Rosamond area	Mojave Rock Products Co., 9452 E. Garvey, El Monte (1958)		See text.
	Mountain Minerals dolomite deposit				See Star Dolomite deposit.
	Star Dolomite (Mountain Minerals dolomite deposit, Last Chance Mine) deposit	W½ Cor. sec. 15 (?), T9N, R22W, SBM, (proj.), north side of County Rd., 16 miles west of Frazier Park, ½ mile west of Toad Spr.	E. N. Bramwell and Oatis Turk, Route 1, P.O. Box 261, Taft (1959)	White, fine-grained crystalline dolomite.	Several hundred tons of white dolomite was mined in 1956-1957 (?) and marketed as roofing granules in the Bakersfield area by Frank Bush. Present owners have installed primary and secondary crushers, screens, and storage bins. By Sept. 1, 1959 roofing granules had not been marketed. See Star dolomite deposit under dolomite. (Logan 47:247).
	Tecuya	NE¼ sec. 34, T9N, R20W, SBM, 1½ miles west of Frazier Park, north side of Cuddy Cyn.	Mineral Materials Co., 1145 Westminster Ave., Alhambra (1959); operator, Ted Hines, Industrial Mining and Milling Co., Barstow	White to gray coarsely-crystalline limestone on the steep north side of Cuddy Cyn. in a pendant 200 to 1,300 feet wide and about 2 miles long. Pendant strikes northwest and dips 40° NE.	Crusher, screens, conveyor belts, storage bins and truck-loading facilities were installed late in 1958. During Oct.-Dec. 1958 10,000 tons of 1½ by 6-inch coarse grained white limestone was mined and stockpiled. In May 1959 this plant was processing and bagging roofing granules. See Tecuya under limestone.

Broken rock from the quarries is dumped in a large hopper with grizzly bars set 15 inches apart. A reciprocating feeder moves it to an 18- by 24-inch jaw crusher set at about 2-inch opening. A 40-foot belt conveyor moves crushed rock to a bin from which a bucket elevator carries the rock to a double-deck vibrating screen. Material larger than the top screen (⅜-inch openings) is binned; either for sacking as oversize rock (2-inch to ⅜-inch size range), or to be crushed finer in a 14- by 30-inch roll crusher and returned to the screen. Material smaller than the bottom screen openings (⅛-inch) is removed to a bin for disposal. Material between ⅜- and ⅛-inch screen sizes is the regular size roofing granule and is stored in bins for sacking or for bulk sale. A "cyclone" air blower removes dust arising during the screening operation for disposal with the fines. About eight employees operated the mill and quarries in 1955.

Pink and green granules are produced from pale pink and green colored Miocene rhyolitic flows and tuffs on sec. 8, T. 9 N., R. 12 W., S.B.M., about 1½ miles north of Rosamond. The haul to the plant is about 9 miles. A "gold" colored granule is obtained from another Miocene volcanic rock in sec. 4, T. 10 N., R. 12 W., S.B.M., near the plant.

Green rock has been obtained from time to time from the same layer mined by Groover Mining and Milling Company in Jawbone Canyon. The quarry is 30 miles from the mill. Blue rock has been obtained from blue tuffaceous sandstone in Sand Canyon, also mined by M. and M. Mining Company.

Saline Minerals

The saline minerals are the natural soluble salts in solutions, and soluble residues derived from the evaporation of solutions. Deposits of saline minerals are found only in arid regions unless the deposits have been buried and protected from solution. The Kramer borate district of eastern Kern County is the world's largest known source of boron minerals. The county also produces a very substantial tonnage of gypsite, the earthy form of gypsum, for agricultural use on San Joaquin Valley farms. A modest tonnage of crude and semi-refined salt is obtained for industrial use and the feeding of livestock. In recent years the value of the saline commodities produced in Kern County has exceeded $30 million per year or 60 to 65 percent of the value of all mineral commodities exclusive of petroleum fuels. The saline minerals mined in Kern County—borates, gypsum and gypsite, and salt—are each discussed in separate sections of this report.

Salt

By William E. Ver Planck

Common salt (NaCl) is found in certain playas in Kern County. Goodyear (1888, p. 312) reported its production from an intermittent lake in Tehachapi Pass prior to 1900. At present a few thousand tons a year are obtained from Koehn Lake near Saltdale.

Koehn Lake is a playa in T. 30 S., R. 38 E., M.D.M., about 20 miles northeast of Mojave. The playa, at an elevation of 1,920 feet, lies in Cantil Valley, an undrained, alluvium-filled trough between El Paso Mountains to the northwest and the Rand Mountains to the southeast. Cantil Valley is thought to have formed by faulting in early Pleistocene time (Dibblee, 1952, p. 42). The central part of Koehn Lake contains clay covered with an efflorescent, saline crust. Sodium chloride-sulfate brine is obtained from shallow wells near Saltdale, but deposits of salt or other saline minerals have not been found. West of the playa near Cantil fresh water is obtained from wells. Selenite crystals and gypsite are present on the south margin (see *Gypsum* section in this report), and ulexite cotton balls (sodium calcium borate) have been found on the west margin. In most years, rainfall in the basin is sufficient for a thin sheet of water to collect in the lowest part of the playa and dissolve the efflorescent crust. The brine thus formed contains sodium chloride with a minor amount of calcium sulfate. Salt is obtained by the solar evaporation of surface and well brine in ponds.

*Saltdale Works, Long Beach Salt Company (Long Beach Salt Company, Consolidated Salt Company).** Location: Secs. 34, 35, 36, T. 29 S., R. 38 E., M.D.M., and secs. 1, 2, 3, 9, 10, 11, 14, 15, 16, T. 30 S., R. 38 E., M.D.M., on Koehn Lake south of Saltdale. The plant is in section 3 at Saltdale on the Owenyo Branch of the Southern Pacific Company. Ownership: Long Beach Salt Company, 2476 Hunter Street, Los Angeles (1958).

Salt was first produced at Saltdale in 1914 by the Consolidated Salt Company, but the Diamond Salt Company carried out development work in 1911 and 1912. A second producer, the Fremont Salt Company, commenced operations near Toby in 1919. About 1928, both companies were bought by the Long Beach Salt Company, and the Fremont plant was dismantled. Since 1950, the Long Beach Salt Company has been a wholly owned subsidiary of the Western Salt Company.

During the summer of 1957 Long Beach Salt Company completed three brine wells about 200 feet deep in SE¼ sec. 3, T. 30 S., R. 38 E., M.D.M., that yielded comparatively small flows of sodium chloride-sulfate brine containing about 12 percent sodium sulfate. Formerly the operation was dependent upon the run-off of storm water from the surrounding mountains which collects in the lake and dissolves the efflorescent salts. Formerly, lack of rain caused the plant to be idle for periods of several years duration, but the wells now furnish an alternate source of brine.

Surface brine is collected in the lowest part of the playa by means of a long ditch that terminates at the north shore of the playa close to the evaporating ponds. Run-off water that accumulates on the playa surface is left in the playa until it has been concentrated by solar evaporation. Brine is taken whenever the specific gravity is between 20° and 24° Be. At this concentration the slightly soluble calcium bicarbonate and most of the gypsum originally present have been precipitated, and

* Plant visited March 1958.

the brine is nearly saturated with sodium chloride. At higher concentrations salt crystallizes in the pumps, and the brine is difficult to handle. As the evaporating brine approaches 20° Be it is reduced to a thin sheet that the wind readily moves about over the nearly level playa surface. Frequently it is blown beyond the reach of the collecting ditch; and upon its return, it may be too concentrated to handle. In order to avoid the loss of a potential crop, brine can be taken at an earlier stage and brought to saturation in a 40-acre concentrating pond. Ordinarily, however, nearly concentrated brine is pumped from the ditch and distributed by means of flumes to the crystallizing ponds. The plant has five rectangular crystallizing ponds with a total area of 26 acres. They have natural mud bottoms and are constructed of earth levees. The crystallizing ponds are filled to a depth of 30 inches and the brine is allowed to evaporate almost to dryness. Normally evaporation progresses about 4 months, and about 6 inches of salt forms.

Formerly the salt in the crystallizing ponds was harvested by hand. First the salt was cut into cakes approximately 1 foot square with a gasoline-powered circular saw mounted on wheels. Then men turned the cakes on edge and scraped a ¼- to ½-inch layer of mud and gypsum from the bottom of the cakes. Only a few cakes were turned up at a time because the scraping had to be done before the exposed salt hardened. Finally the cakes were loaded by hand into dump cars.

Mechanized harvesting was adopted about 1954. Now the salt is scraped into a pile along one side of the pond, leaving a thin layer unharvested to provide a footing for the equipment. A scoop loader then transfers the salt to dump cars. Before the pond is refilled, the bottom is smoothed with a drag. Salt produced from surface brine in this way is pure enough for marketing as crude salt. When surface brine is not available, the crystallizing ponds are filled with sodium chloride-sulfate brine from wells. The evaporation and harvesting are carried out as described above except that the salt is contaminated with sodium sulfate and must undergo additional treatment before marketing.

Plymouth locomotives haul the cars of salt to the mill at Saltdale, three-quarters of a mile north of the crystallizing ponds. Here the salt is discharged into a dumping pit and thence, by means of a reciprocating feeder, to a toothed roll crusher. The crushed salt is lifted in a bucket elevator to the top of the mill building; and, if the salt was made from surface brine, it goes directly to the storage bin. Impure salt made from well brine is mixed with wash water and brought outside the mill again to a washer near the dumping pit. The washer is an inclined trough in which a revolving screw discharges clean salt from one end, while wash water with dissolved sodium sulfate overflows from the other. The washed salt is stacked nearby. At night or when harvesting is not going on, the washed salt is fed into the dumping pit and raised by means of the main elevator to the storage bin.

Crude salt from the storage bin passes through a scalping screen which removes plus ⅜-inch lumps for recrushing with rollers. Some of the minus ⅜-inch material is shipped in bulk as undried crude salt, but much of it is kiln dried with an oil-fired, rotary drier about 15 feet long and 5 feet in diameter. The kiln-dried salt can be sized with Tyler Hummer screens in circuit with crushing rolls. The mill also contains sacking equipment and a multiple section trommel screen for sizing the undried crude salt. Much of the output is consumed locally as feed for cattle, but some is used in the Los Angeles area for such purposes as the icing of refrigerator cars and the regeneration of zeolite water softeners.

SALT

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
475	Cameron Lake	Secs. 28, 29, T32S, R34E, MDM, 5 miles east of Tehachapi	Undetermined, 1958	Saline crust of intermittent lake.	Salt 92-98 percent pure scraped from dry bed of the lake in late summer. Production of 100 to 200 tons per year. Idle since before 1900. (Bailey 02: 312; Hanks 82:219; Goodyear 88:312).
	Canada de las Uvas (now known as Grapevine Canyon)	Not ascertained	Undetermined	Saline crust.	Salt recovered by leaching and recrystallization 14 miles from mouth of Canada de las Uvas prior to 1882. (Bailey 02:120; Hanks 82:219).
	Consolidated Salt Co.				See Saltdale works. (Tucker 21:315; 29:81; Ver Planck 58:116).
	Diamond Salt Co.	T30S, R38E, MDM, on Koehn Lake	Undetermined, 1958; Diamond Salt Co., J. K. Wilson, Pres. (1912)	Surface brine of Koehn Lake.	Development 1911 and 1912. No record of production. (Ver Planck 58:116).
476	Fremont Salt Co.	Crystallizing ponds in SW¼ sec. 1 and SE¼ sec. 2, T30S, R38E, MDM, on Koehn Lake	Fremont Salt Co., P.O. Quackenbush, Pres. (1927)	Surface brine of Koehn Lake.	Production of salt by solar evaporation of surface brine, 1919-1927. Property bought by Long Beach Salt Co. and plant dismantled. (Ver Planck 58:116).
	Long Beach Salt Co.				See Saltdale works. (Dibblee, Gay 52: 51; Tucker, Sampson, Oakeshott 49:250).
477	Saltdale works (Consolidated Salt Co., Long Beach Salt Co.)	Secs. 34, 35, 36, T29S, R38E, secs. 1, 2, 3, 9, 10, 11, 14, 15, 16, T30S, R38E, MDM, on Koehn Lake	Long Beach Salt Co., 2476 Hunter St., Los Angeles (1958)		See text. (Dibblee, Gay 52:51; Tucker 21:315; 29:81; Tucker, Sampson, Oakeshott 49:250; Ver Planck 58:74).

Sand and Gravel

By Harold B. Goldman

The total recorded production of sand and gravel in Kern County from 1915 to 1958 amounts to about 13 million tons valued at about 16 million dollars. More than 70 percent of this total was produced since World War II as a result of the marked increase in industrial and building activity. Production has increased steadily since 1946, with minor setbacks, and in 1957 about 1 million short tons of sand and gravel valued at about 1.4 million dollars was produced. Most of the material was obtained from the Pliocene ** Kern River formation northwest of Bakersfield, Quaternary terrace deposits of the Kern River northeast of Bakersfield, and alluvial fans of San Emigdio and Salt-Tecuya Creeks in the south end of the San Joaquin Valley (fig. 96). Sand and gravel were also obtained from an alluvial fan deposit on the south slope of El Paso Mountains near Randsburg, and from stream beds of the Kern River near Kernville, Erskine Creek near Isabella, and Cuddy Creek near Lebec. Sand was produced from Caliente Creek near Edison and Sand Creek near Inyokern. In the past, significant amounts of sand and gravel have been produced from the alluvial fan at the mouth of Grapevine Creek; terrace deposits along Cottonwood Creek, a tributary to Kern River; and the floodplain of the Kern River.

The major resources of sand and gravel in Kern County are in stream deposits along the east side of the San Joaquin Valley and in the foothills of the Sierra Nevada; and in alluvial fan deposits on the north flank of the San Emigdio Range and Tehachapi Mountains at the south end of the San Joaquin Valley. Although the western part of the county is deficient in gravels, conglomerate of the Plio-Pleistocene Tulare formation is processed intermittently for gravel in that area. Most of the Recent alluvium in the valley floor is composed of sand and is a source of road-base materials.

Most of the sand and gravel deposits being mined in Kern County are centered about the Bakersfield area. These deposits, which account for more than half of the total annual production, have been studied in detail and are the subject of a recent report (Goldman and Klein, 1959), from which the following information was abstracted.

The sand and gravel that form the Recent stream bed, floodplain, and Quaternary terrace deposits along the Kern River extend from the mouth of Kern Canyon to Bakersfield. The Pliocene Kern River formation consists of silt, sand, and gravelly strata that form an alluvial fan deposit of the ancestral Kern River.

Commercially suitable deposits of sand and gravel are present in the Recent floodplain of the Kern River for a distance of about 5 miles, 2 miles upstream and 3 miles downstream from Kern River Park, which is 4 miles northeast of Bakersfield. These floodplain deposits of sand and pebble- to cobble-gravel range from half to three quarters of a mile in width and are as much as 20 feet thick. There was no production from these deposits in 1958.

The Quaternary terrace deposits, on both sides of the river for about 8 miles northeast from Bakersfield, are

** The Kern River formation is considered to be Pliocene and Pleistocene in age by some stratigraphers, but is listed as Pliocene in this section of this report.

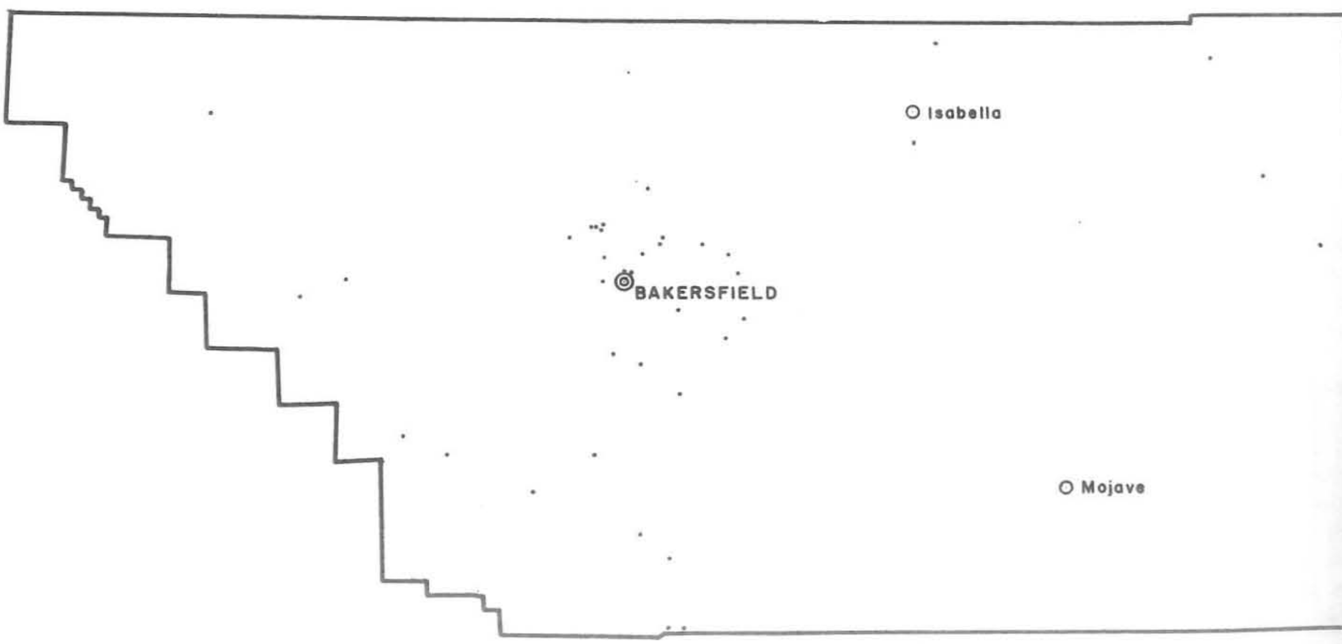


Figure 96. Map of principal sources of sand and gravel in Kern County.

SAND AND GRAVEL

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
478	Blackwell Corners deposit	Sec. 27, T26S, R20E, MDM, 7 miles west-northwest of Lost Hills	Undetermined, 1958	Sand deposit in alluvial fan of Bitterwater Creek.	Source of sand used for State roads.
479	Brown, J. W., Rock Plant	Sec. 36, T32S, R24E, MDM, 4 miles northeast of Maricopa	Undetermined, 1958; Leased by J. A. Brown	Gravel pit in Plio-Pleistocene Tulare (?) formation.	See table in text. Source of paving gravel. Active in 1958.
480	C and H Materials pit	Sec. 4, T29S, R29E, MDM, 6 miles northeast of Bakersfield	Undetermined, 1958	Sand and gravel in Recent flood-plain deposits of Kern River.	Inactive pit since 1953.
481	Caulay pit	Center sec. 31, T28S, R27E, MDM, 5 miles northwest of Bakersfield	Undetermined, 1958	Sand pit in Recent valley alluvium.	Inactive. Used in State highways.
482	County pit	Secs. 19, 30, 31, T31S, R29E, MDM, 4 miles west of Arvin	Kern County	Sand deposit in Recent valley alluvium.	Intermittent source of sand used in construction and maintenance of county roads.
483	County pit	Sec. 11, T29S, R27E, MDM, 1 mile west of Oildale	Kern County	Sand deposit in Recent valley alluvium.	Intermittent source of sand used in construction and maintenance of county roads.
484	County pit	Center sec. 7, T30S, R29E, MDM, 2 miles southwest of Edison	Kern County	Sand pit in Recent valley alluvium.	Intermittent source of sand used in construction and maintenance of county roads.
485	County pit	Sec. 1, T31S, R27E, and sec. 6, T31S, R28E, MDM, 1 mile southwest of Greenfield	Kern County	Sand deposit in Recent valley alluvium.	Intermittent source of sand used in construction and maintenance of county roads.
486	Cuddy Creek (Terminal Rocks Co.)	Secs. 31, 32, T9N, R19W, SBM, 2 miles southwest of Lebec	Leased from U. S. Government	Sand and gravel in Recent stream deposit of Cuddy Creek.	See Terminal Rock Co. in table in text. A new pit developed in 1958 to supply aggregate for highway construction.
487	Dicco pit	Sec. 28, T28S, R27E, MDM, 5 miles northwest of Bakersfield	Dicco, Inc., Bin 217, Sta. A, Bakersfield (1958)	Sand and gravel in Plio-Pleistocene Kern River formation.	See table in text. Active pit since 1952. Sand and gravel used mostly as bituminous aggregate.
488	Dougherty pit	Sec. 9, T31S, R28E, MDM, 1½ miles southeast of Greenfield	Undetermined, 1958	Sand deposit in Recent valley alluvium.	Inactive pit. Source of sand used in construction of State highway.
489	Edison Sand Co. pit	Sec. 17, T30S, R30E, MDM, 4 miles east-southeast of Edison	Edison Sand Co., 118 34th St., Bakersfield (1958)	Dune sand derived from Caliente Creek.	See table in text. Sand used for several purposes.
490	Elsey pit	NW¼ sec. 30, T29S, R23E, 1½ miles south of Lokern	Undetermined, 1958	Sand deposit in Recent valley alluvium.	Inactive pit. Source of sand used in construction of part of State Hwy. 178.
491	Griffith Const. Co. pit	NW¼ sec. 9, T29S, R28E, MDM, 3 miles northeast of Bakersfield	Griffith Const. Co., P.O. Box 175, Sta. B., Bakersfield (1958)	Sand and gravel in Quaternary terrace deposit	See table in text. Source of concrete and paving aggregate since 1946.
492	Grossardt pits	One in sec. 28, T25S, R38E, northwest of Ridgecrest, another in sec. 9, T29S, R40E, MDM, south of Ridgecrest	Both sites leased by W. B. Grossardt, 430 Robertson Rd., Ridgecrest (1958)	Sand and gravel deposits in Recent alluvial fans. One is on east slope of Sierra Nevada; the other is on south slope of El Paso Mountains.	See table in text. Material used as concrete aggregate.
	Hartman				See Thomas Const. Co.
493	Hartman Fox plant	Sec. 2, T29S, R28E, MDM, 5 miles northeast of Bakersfield	Undetermined, 1958	Sand and gravel in Quaternary terrace deposit.	Inactive since 1956.
494	Hartman San Emigdio Plant	Sec. 13, T11N, R22W, SBM, 26 miles south-southwest of Bakersfield	Hartman Concrete Materials Co., P.O. Box 1632, Bakersfield (1958), has lease on 2 square miles	Recent alluvial fan of San Emigdio Creek.	See table in text. Source of sand and gravel for concrete aggregate and road base material since 1956.
495	Isabella Readimix pit	Sec. 8, T27S, R33E, MDM, 4 miles south of Isabella	Isabella Readimix, Isabella (1958)	Recent stream bed of Erskine Creek.	See table in text. Producers sand and gravel for concrete aggregate.

SAND AND GRAVEL, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
496	Kern Rock Co. pit	Sec. 12, T29E, R29S, MDM, 12 miles east of Bakersfield	Undetermined, 1958	Sand and gravel in Recent gravels of Cottonwood Creek.	Active 1952-1953.
497	Kern Rock Co. Wheeler Ridge plant	Sec. 2, T10N, R20W, SBM, 5 miles south of Mettler Station	Kern Rock Co., P.O. Box 1697, Bakersfield (1958), holds land by lease	Tilted alluvial fan deposit of Salt and Tecuya Creeks.	See table in text. Plant, started in 1958, produces concrete aggregate and road base material.
498	Kern Rock Co., Union Paving Co. pit (Bakersfield plant)	Sec. 27, T28S, R27E, MDM, 5 miles northwest of Bakersfield	Kern Rock Co., P.O. Box 1697, Bakersfield (1958), leases land from Standard Oil Co.	Sand and gravel deposit in Plio-Pleistocene Kern River formation.	See table in text. Pit operated by Union Paving Co. 1942-1952; by Kern Rock Co. since 1953.
499	Kern Rock Co. pit	Sec. 20, T10N, R19W, SBM, (proj.), 9 miles south of Mettler Station	Undetermined, 1958	Recent alluvial fan of Grapevine Creek.	Operated 1936-1946 to produce bituminous aggregate for construction of segment of U. S. Hwy. 99.
500	Kern Rock Co. pit	Sec. 15, T25S, R33E, MDM, 1 mile east of new Kernville	Kernville Rock Co., Kernville (1958), leases several acres	Sand and gravel deposit in stream bed of Kern River.	See table in text. Pit, started in 1956, is source of concrete aggregate, plaster sand, and drain rock.
501	Kramer pit	Sec. 28, T28S, R27E, MDM, 5 miles northwest of Bakersfield	State of California (1958)	Sand and gravel in Recent alluvium derived from Plio-Pleistocene Kern River formation.	Inactive, 1958. Source of sub-base for State highways.
502	Mettler pit	E½ SE¼ sec. 25, T30S, R29E, MDM, 5 miles north of Arvin	Undetermined, 1958	Sand deposit in Recent valley alluvium.	Inactive, 1958. Source of sand used in the State highway construction.
503	Phoenix Const. Co. pit	Sec. 19, T29S, R30E, MDM, 11 miles east of Bakersfield	Undetermined, 1958	Sand and gravel in Quaternary terrace deposit of Cottonwood Creek.	Intermittently active pit. Material stripped by bulldozer, crushed in portable crusher in pit, and processed for bituminous aggregate for use on contractor's own jobs.
504	Rinker Rock Co. pit	Sec. 27, T28S, R27E, MDM, 5 miles northwest of Bakersfield	Rinker Rock Co., P.O. Box 810, 19098 James Rd., Bakersfield (1958), leases from Hood and Bloomer	Sand and gravel in Plio-Pleistocene Kern River formation.	See table in text. Source of sand and gravel for concrete and road base since 1956.
505	River Rock Co. pit	Sec. 35, T28S, R28E, MDM, 5 miles northeast of Bakersfield	River Rock Co., P.O. Box 65, Oildale (1958), leases from Shell Oil Co. and Southern Pacific Co.	Sand and gravel in Quaternary terrace deposit along Kern River.	See table in text. Source of sand and gravel for concrete and paving aggregate since 1954.
	Splane (Triangle Rock Prod.) pit	Sec. 9, T29S, R40E, MDM, 5 miles north of Randsburg	Triangle Rock Prod., Inc., P.O. Box 57, Inyokern (1958), leases about 1600 acres	Sand and gravel in Quaternary alluvial fan on south slope of El Paso Mountains.	See Triangle in table in text. Pit operated by Splane 1947-1951; by Triangle since 1951.
506	Standard Oil Co. pit	SE¼ sec. 5, T30S, R22E, MDM, 2 miles north of McKittrick	Standard Oil Co., (1958)	Sand in Recent valley alluvium.	Inactive pit. Source of sand for construction of part of State Highway 33.
507	Standard Oil Co. pit	SW¼ sec. 34, T32S, R27E, MDM, 5 miles northeast of Mettler Station	Standard Oil Co. (1958)	Sand in Recent valley alluvium.	Inactive pit. Source of sand for construction of State Highway.
508	Standard Oil Co. pit	Center sec. 19, T32S, R24E, MDM, 1 mile southeast of Taft	Standard Oil Co. (1958)	Sand in Recent valley alluvium.	Inactive Source of sand used in construction of State Highway 33.
	Terminal Rock Co. pit	Sec. 33, T9N, R19W, SBM, 0.4 mile west of U.S. Hwy. 99 on Frazier Park Rd.	Terminal Rock Co., 6851 East Ave., Little Rock (1958), leases from U. S. Govt.	Sand and gravel deposit in stream bed of Cuddy Creek.	See table in text. Total output to be supplied to contractor rebuilding segment of U. S. Highway 99.
509	Thomas Const. Co. pit (Bakersfield Rock, Hartman)	Sec. 19, T29S, R28E, MDM, in city of Bakersfield	Thomas Const. Co., Bakersfield (1958)	Sand and gravel in Plio-Pleistocene Kern River formation.	Excavating sand and gravel in 1958 for use as subbase in construction on U.S. Highway 99.
510	Triangle Rock Products, Inc. pit (Splane)	Sec. 9, T29S, R40E, MDM, 5 miles north of Randsburg	Triangle Rock Products, Inc., P.O. Box 57, Inyokern (1958), leases about 1600 acres	Sand and gravel in Quaternary alluvial fan on south slope of El Paso Mountains.	See table in text. Pit operated by Triangle since 1951.

SAND AND GRAVEL, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Union Paving Co. pit				See Kern Rock Co. in table in text.
511	Webster Sand Co. pit	Sec. 26, T29S, R27E, MDM, 2 miles southwest of Bakersfield	Webster Sand Co., P.O. Box 271, Bakersfield (1958)	Sand in Recent stream bed of Kern River.	See table in text. Active, 1958.
512	Unnamed	N½ sec. 4, T28S, R28E, MDM, 10 miles northeast of Bakersfield	Undetermined, 1958	Sand deposit in Poso Creek.	Inactive 1958. Source of sand for construction of State highway.
513	Unnamed	Center sec. 32, T27S, R39E, MDM, 8 miles south of Inyokern	Undetermined, 1957	Sand and gravel in Quaternary fan on north slope of El Paso Mountains.	Inactive, 1958. Large, rounded boulders of basaltic rock common.

composed of sand and pebble- to boulder-gravels. The terrace deposits are irregular in plan. Each is about half a square mile to 1 square mile in areal extent, and is as much as 50 feet thick. Two commercial plants are producing from these deposits.

Lenses of conglomerate containing boulders as large as 18 inches in diameter are found in the Pliocene Kern River formation on both sides of the Kern River near Bakersfield. The coarsest part of the formation is 5 miles east of Bakersfield where it is excessively bouldery. North of Bakersfield the formation consists of much finer material. Production from this formation has centered in an area 5 miles to the northwest of Bakersfield. In 1958, three commercial plants were active here.

The gravels in the floodplain and terrace deposits of the Kern River in the Bakersfield area are composed mainly of granitic and gabbroic rocks (about 45 percent), quartzitic metasedimentary rocks (17 to 27 percent), metavolcanic rocks (24 to 35 percent), and micaceous schist and gneiss (2 to 3 percent).

The gravels of the Kern River formation are composed mostly of metavolcanic rocks (about 44 percent), quartzitic metasedimentary rocks (about 27 percent), granitic and gabbroic rocks (about 25 percent), and micaceous schist and gneiss (about 2 percent).

The most common physically unsound rocks are the weathered metavolcanic rocks and micaceous schist and gneiss, particularly those in the Quaternary terrace deposits and the Kern River formation, which have undergone post-depositional deterioration.

Laboratory compression tests, conducted by the Kern County Department of Highways and Bridges on aggregate sources in Kern County indicate that material most suitable for concrete aggregate is that in the San Emigdio fan. It is of the highest quality, presumably because of the abundance of hard, tough, durable rock in the gravel fraction and the low proportion of mica in the sand fraction. The gravels are composed mainly of granitic rocks (about 65 percent), quartzitic metasedimentary rocks (about 14 percent), sandstone (about 10 percent), micaceous schist and gneiss (about 7 percent), and marble (about 5 percent).

The mining and beneficiation of sand and gravel deposits in Kern County are performed very simply. Overburden, if present, is stripped off with bulldozers and the sand and gravel is excavated with power shovels or draglines. End-dump trucks are used to haul the pit-run material to a processing plant, ordinarily a maximum distance of several hundred feet. The Triangle Rock Company, however, hauls gravel 17 miles to their plant near Inyokern. Selective quarrying methods are used in some pits to avoid thick lenses of sand, undesirable rock, and caliche layers, which commonly are near the top of the Kern River formation.

The processing plants generally consist of a primary jaw crusher, secondary roll or cone crushers, standard vibratory screens, and wheel or screw-type sand classifiers. Sand and gravel for concrete aggregate is washed. Descriptions of the commercial operations in Kern County are summarized in table 24.

Table 24. Active sand and gravel

Operator Name and address	Location of deposit Sec.	Twp.	Range	B. & M.	History of operations	Geologic data	Holdings	Quarry data Excavating equipment and haulage
Brown, J. W., Taft	36	32 S	24 E	M D		Plio-Pleistocene continental Tulare formation; cobble gravel bed, 10-ft. thick dips about 20° N.	Leased	Minus 1½ inch material from grizzly loaded on trucks.
Dicco, Inc., Bin 217, Sta. A, Bakersfield	28	28 S	27 E	M D	Started 1952	Kern River formation. Cobbly layers interbedded with sand beds 1 to 3 ft. thick. Maximum size of boulders is 12 inches.		End-dump truck loaded by power shovel. Gravel hauled several hundred feet to plant.
Edison Sand Co., 118 34th St., Bakersfield	17	30 S	30 E	M D	Started 1946	Dune sand from Caliente Creek.		Two power shovels, skip loader, dragline, and one pit truck.
Griffith Construction Co., Box 175, Sta. D, Bakersfield	NW¼ 9	29 S	28 E	M D	Started 1946	Quaternary terrace of Kern River. Thin lenticular gravelly layers as much as 3 ft. thick interbedded with sand lenses as much as 8 ft. thick.	About 30 acres leased from Tidewater Oil Co.	Lima dragline and shovel load end-dump trucks. Gravel hauled serveral hundred feet to plant.
Grossardt, W., 430 Robertson Rd., Ridgecrest	28	25 S	38 E	M D		Alluvial fan east of Sierra Nevada.	Leased	Bulldozer. Haul 11 miles by truck to plant.
Grossardt, W., 430 Robertson Rd., Ridgecrest	9	29 S	40 E	M D		Alluvial fan on south flank of El Paso Mountains.	Leased	Bulldozer. Haul 17 miles by truck to plant.
Hartman Concrete Matls. Co., P.O. Box 1632, Bakersfield	13	11 N	22 W	S B	Started 1956	Alluvial fan of San Emigdio Creek. Flat-lying layers of pebble-to-cobble gravel, 2 to 3 ft. thick interbedded with silty sand. Some boulders 3 ft. in diameter. Dry deposit.	2 square miles leased	1½-yard dragline to excavate and load. Truck haul several hundred feet to plant.
Isabella Readimix, Isabella	8	27 S	33 E	M D		Stream bed of Erskine Creek.		Bulldozing over loading ramp.
Kern Rock Co., Bakersfield plant, P.O. Box 1697, Bakersfield	27	28 S	27 E	M D	Took over Union Paving Co. plant (1942-1952) in 1953	Kern River formation; underlies 1 to 2 ft. of overburden. Cobbly layer, 10 to 15 ft. thick contains 6 to 8 inch cobbles in sandy matrix.	Leased from Standard Oil Co.	Dragline loads 18-ton end-dump truck for half-mile haul to plant.
Kern Rock Co., Wheeler Ridge plant, P.O. Box 1697, Bakersfield	2	10 N	20 W	S B	Started in 1958	Alluvial fan deposit of Salt-Tecuya Creeks; thin bedded, dips about 15° N. Pebble to cobble lenses, 2 to 3 ft. thick interlayered with sand lenses. Some boulders as much as 3 ft. in diameter. Dry deposit.	Leased	2½ cu. yard power shovel loads three 20-ton end-dump trucks for haul to plant.
Kernville Rock Co., Kernville	15	25 S	33 E	M D	Started late in 1956	Stream bed deposit of Kern River.	Several acres leased	Tractor with front end loader moves pit run to screening plant.
Rinker Rock Co., P.O. Box 810, 19098 James Rd., Bakersfield	27	28 S	27 E	M D	Started early in 1956	Kern River formation. Mostly cobble gravel in sandy matrix. Maximum size is 8 to 12 inches. Overburden 1 to 2 ft. thick.	Leased from Hood and Bloomer	Dragline loads Euclid end-dump trucks which haul material several hundred feet to plant.
River Rock Co., P.O. Box 65, Oildale	35	28 S	28 E	M D	Started Sept. 1954	Quaternary terrace deposit. Highly lenticular cobble-boulder gravel lenses, 6 ft. in maximum thickness, and sand layers 6 to 12 ft. thick.	Leased from Shell Oil Co. and Southern Pacific Co.	Strip with bulldozer, excavate with dragline, haul about ¼ mile in trucks to plant.

producers in Kern County during 1958.

Approximate size of excavation	Plant data Crushing and classifying equipment	Products	Reported capacity	Number of employees	Remarks
300 ft. long, 20 ft. wide, 15 ft. deep		Paving gravel			Asphaltic concrete produced for oil-field roads. Gravel contains gyspum seams and reactive opaline shale.
800 ft. long, 500 ft. wide, 15 ft. deep	Primary jaw crushers, standard vibratory screens, Eagle sand screw.	Paving sand and gravel	Estimated 70 tons per hour		Use material in own hot mix plants.
200 ft. long, 150 ft. wide, 40 ft. deep	Screening.	Sand	2,000 tons per day	2	Sand used for common sand, sandblasting, oil sand, concrete, and mortar.
200 ft. long, 75 ft. wide, 25 ft. deep	18-inch by 36-inch Diamond primary jaw crusher, 4 ft. and 3 ft. secondary cone crushers, and vibratory screens. Washing plant: revolving trommel, 2 sand wheels, vibrating screens.	Concrete and paving sand and gravel, fill	Dry for hot mix plant—175 tons per hour. Wet for concrete—125 tons per hour		Remove as much as 10 ft. of overburden to obtain terrace gravels for concrete aggregate. Obtain asphaltic concrete material by stripping caps off hills underlain by Kern River formation north of terrace gravels. All materials used on own jobs. Has portable readymix plant; asphalt plant on premises.
	Dry screening at pit.	Concrete sand and gravel.			
	Pit run.	Concrete sand and gravel.			
400 ft. long, 300 ft. wide, 20 ft. deep	Primary Kue-Ken jaw crusher, secondary jaw and 2 Nordberg cone crushers, standard vibratory screens, Wemco sand screw, sand drag.	Concrete sand and gravel, road base	300 tons per hour		Service own readimix plants in Bakersfield, Cuyama, and Taft. Haul 40 miles to Bakersfield. Water, obtained from 2,000 ft. abandoned oil well, is reclaimed and reused.
Strips to 4-ft. depth	Dry screening plant.	Concrete sand and gravel			Deficient in gravel-size material. Mostly boulders and sand.
200 ft. long, 100 ft. wide, 20 ft. deep	Primary jaw crusher, secondary Symons cone crusher, washing trommel, sand wheels.	Concrete sand and gravel	70 tons per hour		Sell to other users. Used mostly in own readymix plants. Work on lease arrangement with oil companies.
Semicircular; 200 ft. long, 100 ft. wide, 50 ft. deep	Primary jaw crusher, secondary Symons cone crushers, 7 vibratory screens, Wemco sand screw.	Concrete sand and gravel, road base	600 tons per hour		Service own readymix plants in Bakersfield and sell to oil companies in immediate area. Overburden 4 to 5 ft. deep.
Strips to 4 to 8 ft.	Dry screening plant.	Concrete sand and gravel, plaster sand, drain rock		2	Digs trench in stream bed. Seasonal floods replenish. Output to own readymix concrete. Buy additional material from Bakersfield producer.
700 ft. long, 500 ft. wide, 25 ft. deep	Primary jaw crusher, secondary cone crusher, 4 vibratory screens, sand screw.	Concrete sand and gravel, road base	300 tons per hour	6	Sell output at plant. Sand is coarse, gravel has clay coating difficult to remove.
Irregular stripping over about 3 acres	Primary jaw crusher, secondary roll crushers, Eagle screw.	Concrete and paving sand and gravel	500 tons per day		6-ft. sandy overburden stripped.

Table 24. Active sand and gravel producers

Operator Name and address	Location of deposit: Sec.	Twp.	Range	B. & M.	History of operations	Geologic data	Holdings	Quarry data Excavating equipment and haulage
Terminal Rock Co., 6851 East Ave., Littlerock	33	9 N	19 W	S B	Started in 1958	Stream bed of Cuddy Creek. Mostly angular granitic cobble to boulder gravel. Dry deposit.	Leased from U.S. Government	Bulldozer feeds hopper. Conveyed on belt to plant.
Triangle Rock Products, Inc. P.O. Box 57, Inyokern	9	29 S	40 E	M D	Started 1951, P. R. Splane 1947 to 1951	Alluvial fan on South Flank of El Paso Mountains.	About 1,600 acres leased from P. R. Splane	Drag line in sand pit, power shovel in gravel pit. Truck-haul 17 miles to plant.
Webster Sand Co., P.O. Box 271, Bakersfield	26	29 S	27 E	M D		Stream bed of Kern River.		

Silver

The principal sources of silver in Kern County (fig. 97) have been deposits in the Mojave, Rand, and Loraine mining districts. Other deposits in the Cove and Rademacher districts and elsewhere have yielded smaller quantities of silver, mostly as a by-product from gold ore. Through 1958, silver valued at about $6,000,000 had been recovered from mines in the county, mostly from those worked primarily for gold.

The Mojave mining district has been the principal source of silver in the county. Although in this district, gold is the chief mineral in value, silver is predominant by a 5:1 ratio and is an important by-product of the gold ore. The gold and silver are in veins along faults in Tertiary rhyolitic volcanic rocks. Cerargyrite ($AgCl$) and argentite (Ag_2S) are the most common silver minerals in these veins, but some ores also contain pyrargyrite (Ag_3SbS_3), native silver, stromeyerite ($(Ag,Cu)_2S$), electrum, and argentian tetrahedrite ($(Cu,Fe)_{12}Sb_4S_{13}$). Most of the gold and silver deposits in the Rand district are in veins along faults in Precambrian? schist, and Mesozoic quartz monzonite; some are contained in Ter-

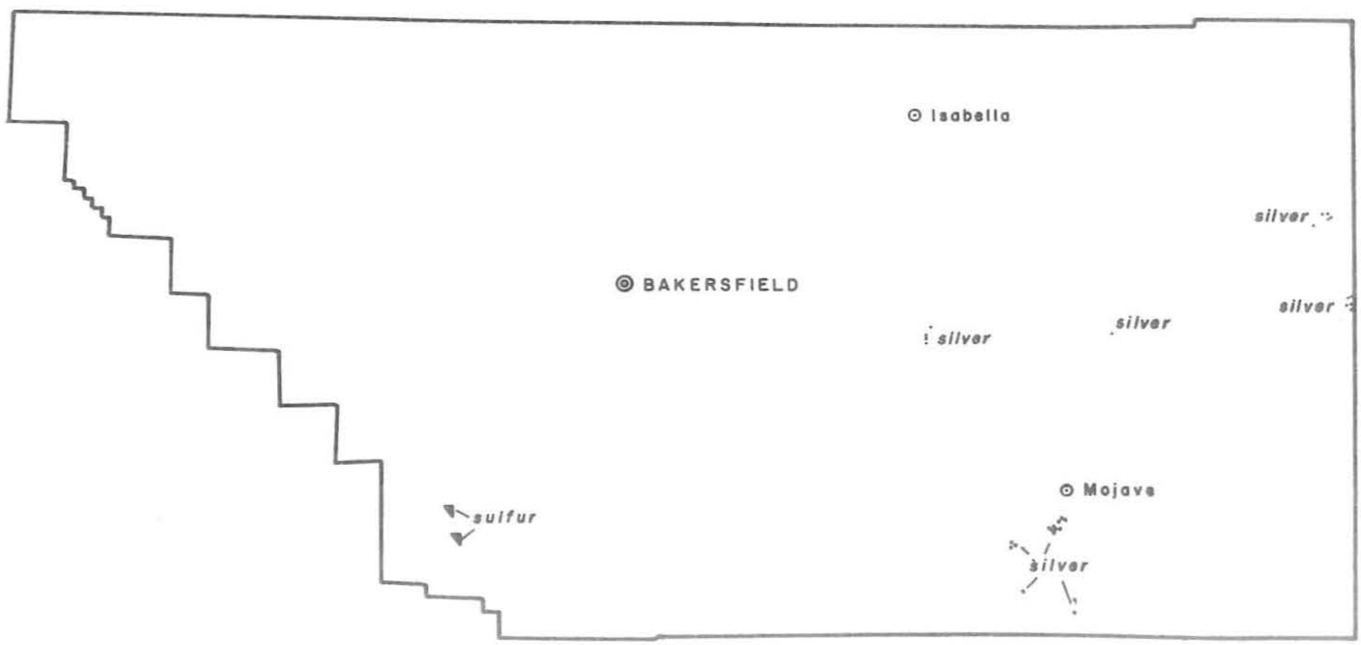


Figure 97. Distribution of silver and sulfur deposits in Kern County.

in Kern County during 1958.—Continued

Approximate size of excavation	Plant data Crushing and classifying equipment	Products	Reported capacity	Number of employees	Remarks
Trench 600 ft. long, 200 ft. wide, 30 ft. deep	Portable plant consists of primary jaw crusher, secondary gyratory crushers, standard vibratory screens, sand screw.	Concrete and paving sand and gravel	300 tons per hour		Temporary site for supplying material for U.S. Highway alteration. Portable hot mix plant on premises. Truck-haul to readymix plant on Wheeler Ridge.
Irregular pit 700 ft. long, 400 ft. wide, 15 ft. deep	Traylor gyratory crusher, conventional screens, sand drag. Dry screening plant at gravel pit.	Concrete sand and gravel, plaster sand	About 75 tons per hour	Average 20	Minus ⅜-inch material left at pit. Plus ⅜ hauled to plant near Inyokern. Output to U.S. Navy.

tiary rhyolitic volcanic rocks. Although the Rand district has yielded more silver than the Mojave district, most of the silver mines are in that part of the Rand district that lies in San Bernardino County. Of the districts in Kern County, therefore, the Rand district ranks second to the Mojave district in silver production. As in the Mojave district, the silver recovered in the Kern County part of the Rand district was largely a by-product from gold ores. Most of the silver, however, is in solid solution with the gold rather than as silver minerals associated with gold. Silver in the veins of the San Bernardino County part of the Rand district is characteristically accompanied by miargyrite ($AgSbS_2$), stylotypite ($3Cu_2S.Sb_2S_3$), pyrargyrite, proustite (Ag_3AsS_3), cerargyrite, and silver bromides. Although this type of deposit was sought extensively in the area west of the Kelly mine (the principal source of silver in the San Bernardino county part of the Rand district), none was found in mineable quantities.

Silver ore valued at more than a million dollars has been mined from veins in the Loraine district. Most of the veins there are wholly within rhyolite dikes which intrude pre-Cretaceous metasedimentary rocks. The mines that have yielded the most silver in the Loraine district are the Amalie and the Gold Peak and Cowboy.

Gold Peak and Cowboy Mines (formerly *Zada* and *Old Cowboy Mines;* also includes *Standard and Golden Cross Prospects* which were formerly the *Edith* and the *Elipse and Paris Prospects*). Location: Mostly in SW¼ and NE ¼ of sec. 28, T. 30 S., R. 33 E., M.D.M., Loraine district, 1 mile south of Loraine, on the east slope of Studhorse Canyon and a quarter of a mile northwest of Eagle's Nest Peak. Ownership: Mr. Clarence G. Tailleur, Caliente, owns eight unpatented claims (1958).

The deposits at the Gold Peak and Cowboy mines were discovered about 1900 and developed independently. At some time between 1933 and 1948 the Gold Peak, Old Cowboy, Standard, and Golden Cross properties were consolidated under their present name. The most productive period was from 1901 to 1906, when the Cowboy mine yielded 70 rail carloads of ore which grossed $125 per ton in silver and gold, and the Gold Peak mine yielded 110 rail carloads which contained an average of $89 per ton in silver and gold. Approximately 600 tons of ore was mined during the periods 1910-15 and 1919-20. Since 1920, very little mining has been done.

The Gold Peak and Cowboy workings are on parallel east-striking veins that occupy fractures or sheeting planes in east-trending rhyolite dikes. The dikes, which are a few tens of feet wide, are intrusive into the west side of a roof pendant composed of pre-Cretaceous metasedimentary rocks. The pendant is one mile wide and trends north-northeast through the Loraine district. The Gold Peak vein crops out near the crest of a prominent east-trending ridge on the east side of Studhorse Canyon. The western end of the Cowboy vein is exposed about 450 feet south of the easternmost exposure of the Gold Peak vein and may be an eastern extension of the Gold Peak vein offset to the south along a north-trending fault, although no fault was observed by the writers. The veins average about 4 feet in width and each has been traced 400 to 600 feet along the strike. The principal ore minerals are cerargyrite and bromyrite with some free gold and rarely ruby silver. The silver to gold ratio of mined ore was 180:1. Quartz and altered wall rock comprise the gangue of the veins and contain minor amounts of pyrite, pyrrhotite, and jarosite (?). Melanterite and hydrous iron oxides are common in weathered and oxidized parts of the veins. Both the hanging and footwalls are bleached and severely altered for several tens of feet on each side of each vein.

Development of the Cowboy vein was done along five east-driven drift adits, aggregating about 1,600 feet of adits and appended workings (fig. 98a). The three upper levels were the only productive levels. These are designated the 200, 300, and 400 levels and are at nearly

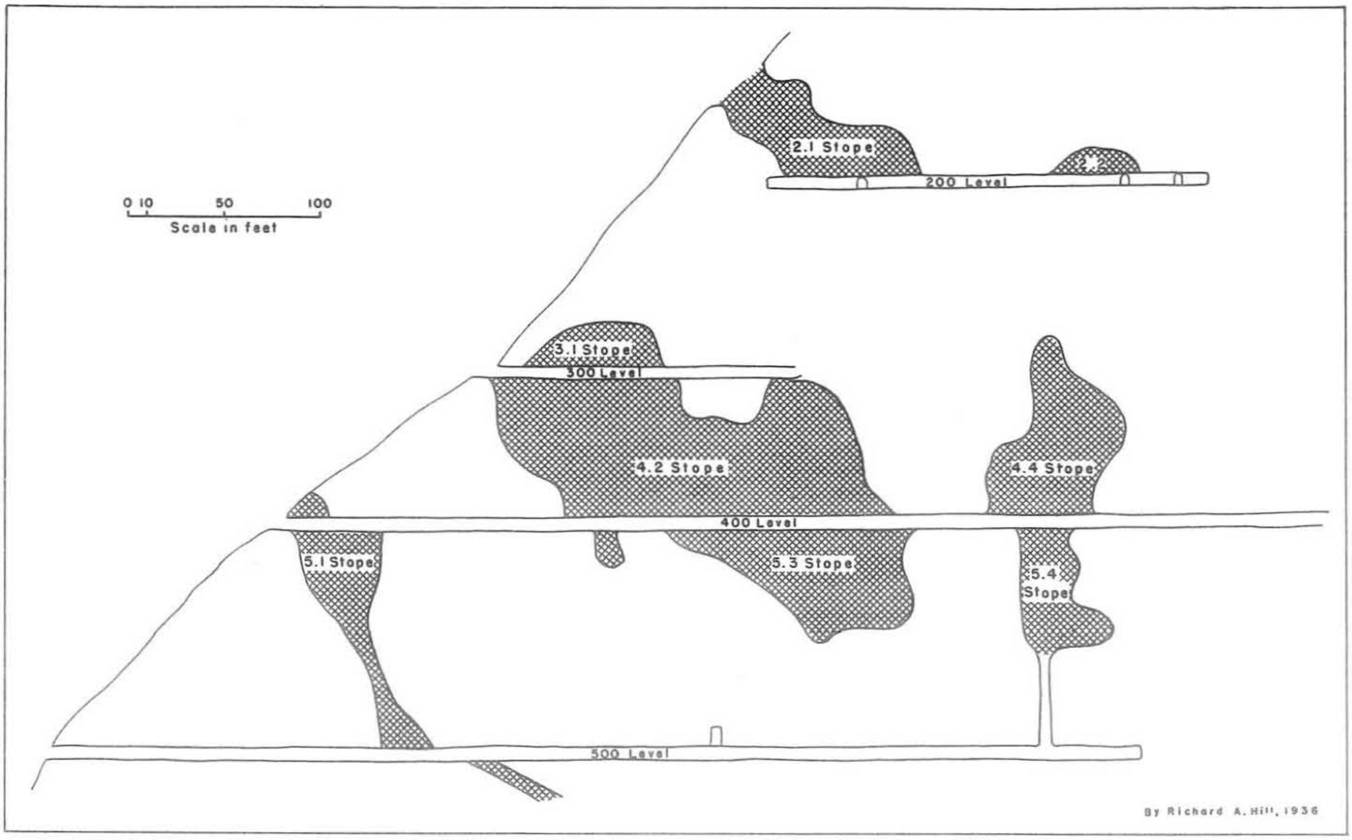


Figure 98a. Longitudinal section of the Cowboy mine.

100-foot vertical intervals. Four ore bodies were mined. The largest was near the portal of the 300 level and extended 180 feet east along strike between the 300 and 400 levels. It extended downward from 20 feet above the 300 level to 60 feet below the 400 level and raked 45° to the east. On the 400 level, 370 feet east of the portal, a vertical ore shoot 50 feet long extended from 100 feet above the 400 level to 70 feet below it. A third ore shoot was mined from the western end of the 200 level to the surface along a strike length of 70 feet. This ore shoot also raked 45° east. The smallest of the four ore bodies was mined to the surface from a point adjacent to the adit of the 400 level along a strike length of 40 feet and to a depth of 40 feet below the 500 level. This shoot raked steeply eastward.

Access to the Gold Peak vein was by four north-driven crosscut adits on three levels. The lowest of these are the "old" No. 3 and No. 3 "tunnels" on the No. 3 level. The portals of these two adits are 400 feet apart and the adits extend 450 feet and 525 feet to the vein from points near the mine road. Three hundred and fifty feet of drifts were driven on the No. 3 level, but no ore bodies were found. The No. 2 level, 200 feet above No. 3 level, was driven about 100 feet N. 20° E. to the Gold Peak vein and provided access to several hundred feet of drifts and crosscuts. No ore was found on the No. 2 level, but four raises were driven to ore bodies on the No. 1½ level 50 feet above. A few hundred feet of drifts were driven on the No. 1½ level above which stopes were mined to the No. 1 level above. From the portal of No. 1 level a crosscut was driven north 90 feet to the vein where a few hundred feet of workings were developed.

The main ore shoot in the Gold Peak vein was 3 to 4 feet wide, had an average strike length of 50 feet, and extended from the surface to 25 feet below the No. 1½ level. The longest part of the ore body was directly above No. 1 level where it was 100 feet long. A second ore shoot was 200 feet to the east and was a maximum of 50 feet long at No. 1 level. It was stoped 75 feet above and 25 feet below the level. In general the ore shoots rake 45°-60° E. (See fig. 98b.)

The Standard and Golden Cross workings are in a canyon several hundred feet east of the Cowboy mine. They consist of drift adits driven on faults and shear zones in rhyolite dikes. Only traces of silver mineralization were found in the few hundred feet of drifts driven along these zones.

Late in 1958, most of the workings on the Gold Peak vein were caved but the workings on the Cowboy vein were accessible.

SILVER

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
514	Amalie (Amalia, Amelia)	NW¼ sec. 22, T30S, R33E, MDM, Loraine dist., on ridge northwest of junction of Caliente Cyn., Sand Cyn.	Clyde E. Mallachowitz, 1102 Kern St., Bakersfield (1958)	Three veins 8 inches to 4 feet wide strike N. 55° W., dip 85° NE. in rhyolite porphyry and schist.	See text. (Aubury 04:8t, 17t; Brown 16: 486; Crawford 94:141; 96:141, 199, 605; Tucker 21:309; 29:24-25; Tucker, Sampson 33:272t, 280, 287; Tucker, Sampson, Oakeshott 49:253t).
	Beehive				Uncorrelated old name; may be in vicinity of Hoover, which see. (Tucker 21:315; Tucker, Sampson, Oakeshott 49:270t).
	Ben Hur mine				See Gold Wash under tungsten. (Hulin 25:129).
515	Big Four prospect	SE corner sec. 26, T30S, R36E, MDM, Jawbone Cyn. area, 3 miles northwest of Cinco	Big Four Mining Co., 3860 W. 139th St., Hawthorne, pres. W. P. Yow, Jr., 6100 Rimpau Blvd., Los Angeles (1959)	North-trending, west dipping silver-bearing vein, a few inches in maximum width; in Tertiary sedimentary rocks.	Five claims under development in 1959.
	Churchill	Reported in sec. 20, T28S, R40E, MDM, El Paso dist. (1929); not confirmed, 1957. Camp site is in sec. 17	Undetermined, 1957	Several thin veins in granite, some are as much as 18 inches thick. Principal vein strikes NW., dips 18° SW. Ore reported to contain high values in silver. (Tucker, 1929, p. 57).	Uncorrelated old name. Developed by 100-foot and 75-foot tunnels and shallow open cuts before 1929. Former owner states mine is near Haggins Well, north of El Paso Peaks. (Tucker 29:57; Tucker, Sampson, Oakeshott 49:271t).
	Cowboy				See Gold Peak and Cowboy mines in text.
	Darling Rosa	Reported in Loraine dist., in the old community of Amalie (Loraine) (1896); not confirmed, 1958	Undetermined, 1958; J. B. Ferris, Caliente (1896)	Fourteen inch-wide vein dipping N. in porphyritic rock.	Uncorrelated old name. Probably listed herein under another name. (Crawford 96:605).
	Edith prospect				See Golden Cross (Aubury 04:10t).
	Ferris mine				See under gold. (Crawford 96:605).
	Fraction claim				Claim of Mizpah-Nevada mine, which see. (Tucker 23:168).
	Gimlet prospect				See Jasper. (Hulin 25:144).
	Golden Cross (Gold Cross, Edith) prospect	NE¼ sec. 28, T30S, R33E, MDM, Loraine dist., ½ mile south of Loraine, in a small tributary cyn. to lower Indian Cr.	C. G. Tailleur, Caliente (1958)	Narrow vein strikes N. 70° W., dips steeply NE.; in schist.	Claim name of Gold Peak and Cowboy group, which see. (Tucker, Sampson, Oakeshott 49:219, 258t).
516	Gold Peak and Cowboy (Zada) mines	SW¼ sec. 28, T30S, R33E, MDM, Loraine dist., about 1 mile southwest of Loraine, ½ mile north of Eagle's Nest Pk., in Studhorse Cyn.	C. G. Tailleur, Caliente (1958)	Four-foot-wide quartz vein strikes generally E., dips 45° S.; in highly altered rhyolite porphyry.	See text.(Aubury 04:11t, 17t; Brown 16: 495, 496; Tucker 29:35, Tucker, Sampson 33:273t; Tucker, Sampson, Oakeshott 49: 219-220, 259t).
	High Grade Ridge claim				Claim of White Horse Rand prospect. (Tucker 23:171).
517	Hoover (Hummer?) mine	SE¼ sec. 30, T28S, R40E, MDM, El Paso dist., 7½ miles northwest of Randsburg, ½ mile south of El Paso Pk.	Rena M. Curl, T. W. Curl, and Walter Noble (1957) addresses undetermined	Shear zone of undetermined length about 1 foot wide strikes N. 10° W., dips 80° W., in limestone west of contact with quartz monzonite. Limestone in vicinity of mine strikes N. 40° W.; vertical. Shear zone contains moderate copper oxide as stains, and disseminated small grains of copper sulfides; also galena. Silver probably associated with galena. Sparsely disseminated sulfide grains in limestone adjacent to shear zone and in a hornblende diorite dike.	Six unpatented claims. Developed by a steeply inclined shaft probably more than 200 feet deep, an 80-foot drift adit that connects with the shaft from the southeast, and numerous prospect shafts and trenches. Probably the same as the Hummer (formerly Jolliver) mine which was first developed about 1851. Production undetermined but probably small. Idle.
	Hummer mine				Formerly Jolliver. Probably the Hoover mine, which see. (Hulin 25:135; Tucker 29:57; Tucker, Sampson, Oakeshott 49: 271t).
	Iconoclast mine				See under gold.
	Isabella mine				See St. Lawrence Rand. (Tucker, Sampson 33:274t).

SILVER, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
518	Jasper (Gimlet) prospect	Center sec. 12, T30S, R40E, MDM, Stringer dist., 2¼ miles southeast of Randsburg	Undetermined	Silicified fault zone strikes N. 25° E. and dips 40° SE. in schist in area of very low relief.	Prospect developed by moderately-deep 80° inclined shaft and several shafts from 20 to about 80 feet deep in search for silver ore in 1920's. Also prospected by bulldozer trenches for placer scheelite in more recent years. No recorded production. Idle. (Hulin 25:144).
	Jersey Lily group				See under tungsten. (Partridge 41:288; Tucker 29:58).
519	Laurel - Rand mine	Cor. secs. 20, 21, 28, 29, T28S, R40E, MDM, El Paso dist., 8½ miles north-northwest of Randsburg, west side of Laurel Mt.	Arthur W. Nobles, 635 N. Harvard Ave., Los Angeles (1957)	Shear zone 1 to 2 feet wide along west side of a 4-foot wide diorite dike which strikes N. 20° W. and dips 80° SW. in quartz monzonite. Shear zone contains free gold, copper oxides, and silver in an undetermined form. Dike is exposed at surface for several tens of feet northwest of main shaft.	Six unpatented claims. Known as Silver Queen mine when main shaft was developed. Part of property was located as early as 1863 as the Manzanillo and Ophir claims. A vertical shaft of undetermined depth has been cleared to the 180-foot level. Numerous other shafts, mostly caved, and adits are also on the property. Probably small production of silver and gold. Idle.
	Mistake claim				Claim of Mizpah-Nevada mine, which see. (Tucker 23:168).
520	Mizpah-Nevada (Satan) mine	NE¼ sec. 1, T30S, R40E, MDM, Rand dist., 1½ miles southeast of Randsburg	J. E. Gilbertson, address undetermined (1957)	Barren quartz stringers in quartz monzonite.	Prospect shaft 150 feet deep with 40-foot crosscut adit to south. No production. Idle since 1923. (Hulin 25:138; Tucker 23:168; 29:58; Tucker, Sampson, Oakeshott 47:271t).
	Mizpah-Tonopah				Uncorrelated old name reported as being northwest of California Rand Silver mine. May be in San Bernardino County. A prospect. (Newman 23:221).
	Monarch Rand group				See under gold. (Tucker 29:58; Tucker, Sampson, Oakeshott 49:271t).
	New claim				Claim of Mizpah-Nevada mine, which see. (Tucker 23:168).
521	Nondescript (Oney lease)	NE¼ sec. 12, T30S, R40E, MDM, Stringer dist., 2 miles southeast of Randsburg	Frank W. Royer, Red Mountain (1957)	NW.-trending, vertical quartz vein in schist. Silver-bearing minerals encountered on 150-foot level.	Vertical prospect shaft 200 feet deep developed in search for silver-bearing veins in early 1920's. Production undetermined. Long idle. (Hulin 25:139).
	Occidental mine				See Amalie mine in text. (Crawford 94:146).
	Old Cowboy				See Gold Peak and Cowboy mines in text.
	Oney Lease				See Nondescript. (Hulin 25:139).
	Spider claim				Claim of Mizpah-Nevada mine, which see. (Tucker 23:168).
522	St. Lawrence Rand (Isabella, K.C.N.) mine	NW¼SE¼ sec. 1, T30S, R40E, MDM, Rand dist., 1½ miles southeast of Randsburg	Frank W. Royer, Red Mountain (1957)	Shear zone in schist strikes N. 65° E. and dips 65° SE. Shear zone is from few inches to 7 feet wide. In most places has well defined walls, and is composed of gray siliceous schist, locally brecciated. Small shoots in shear zone contain pyrite, stibnite, miargyrite, and from $2 to $5 per ton in gold. Three tons of ore from 250-foot level had a value of $75 per ton in silver and gold. Vein not well exposed at surface.	Two patented claims. A deep prospect developed about 1923 in search for silver ore. Two shafts 200 feet apart and about 1,500 feet of drifts on 4 levels to depth of 450 feet. Long idle. (Hulin 25:143; Tucker 23:170; 29:59; Tucker, Sampson 33:274t, 276t, 316; Tucker, Sampson, Oakeshott 49:271t).
523	Togo group	NE¼ sec. 12, T30S, R40E, MDM, Stringer dist., 2¼ miles south of Randsburg	Frank W. Royer, Red Mountain (1957)		Patented claims on west side of Vienna mine. Several shallow excavations. Probably no production. Long idle.
524	Treasure Hill mine	SE¼ sec. 1, T30S, R40E, MDM, Rand dist., 1½ miles southeast of Randsburg	Undetermined, 1957; Treasure Hill Mining Co., (1949) address undetermined	Two converging quartz-bearing fault zones a few feet apart in schist. One zone strikes N. 55° E.; other strikes N. 30° E.; both dip 60° SE., are 1 to 2 feet wide, and of short lateral extent on surface. One vein is 6 feet wide on 400-foot level (Tucker, 1923, p. 170). Vertical shear zone 50 feet to north of shaft collar strikes N. 65° E. and is traceable for several hundred feet. Other minor shear zones exposed to east of shaft in shallow inclined shafts. Vein at depth of 480 feet contains quartz, calcite, pyrite, and locally $5 to $20 in gold (Tucker, 1923, p. 170).	Two claims. Two-compartment vertical shaft to 600-foot depth with levels at 400 and 500 feet, and shallow trenches and inclined shafts. A prospect developed in search of silver ore in 1923-1924. (Hulin 25:143-144; Tucker 23:170-171; 29:60; Tucker, Sampson, Oakeshott 49:271t).

SILVER, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
525	Vienna prospect	NE¼ sec. 12, T30S, R40E, MDM, Stringer dist., 2 miles southeast of Randsburg	Jack V. Schmidt, Valmere S. Grensted, addresses undetermined (1958); leased to R. H. Seaman and K. P. Lancaster, Arcadia	Silver-bearing veins along fault that trends N. 55° E. and dips about 60° SE. in schist. Also scheelite in stringers.	Two vertical shafts developed in search of silver ore during 1920's and inclined shaft under development in 1957.
526	White Horse Rand (High Grade Ridge) prospect	SE¼ sec. 1, T30S, R40E, MDM, Rand dist.	Undetermined, 1957: Mr. L. C. Bills lives on property	Quartz stringers in schist.	Vertical prospect shaft about 200 feet deep developed in search of silver-bearing veins. Work discontinued in 1923. (Hulin 25:144; Tucker 23:171; 29:60; Tucker, Sampson 33:276t; Tucker, Sampson, Oakeshott 49:271t).
	Zada mine				See Gold Peak mine.

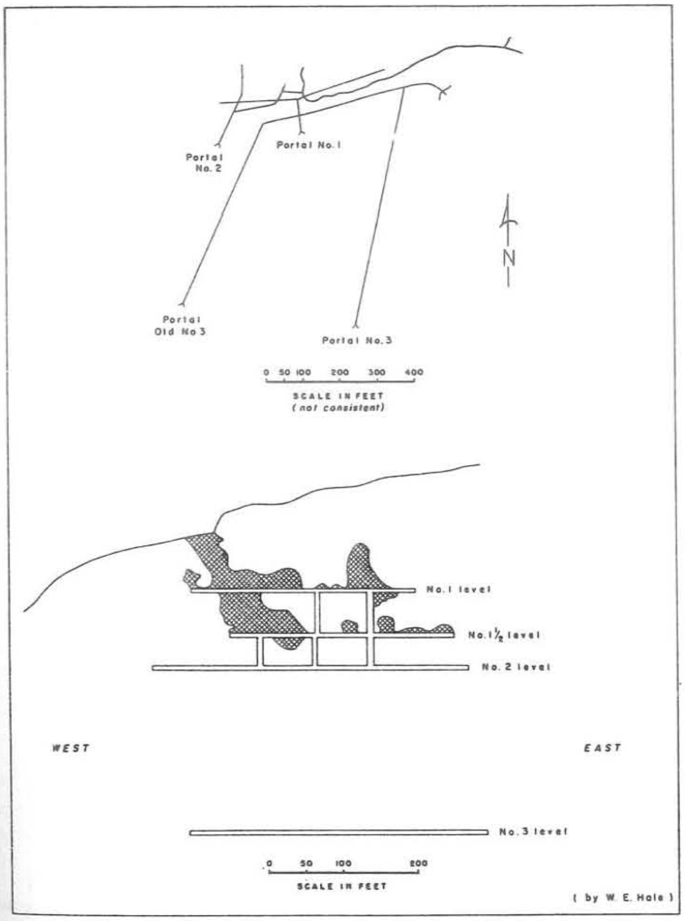


Figure 98b (opposite). Plan and longitudinal section of the Gold Peak mine.

Specialty Sand

One deposit of sand, in western Kern County, has been considered by the owners for use for other than common aggregate. In 1958, however, it was not developed.

Stone

Deposits of marble, sandstone, schist, and other rocks in Kern County have been sources of modest tonnages of building stone which have been utilized as dimension stone, field stone, rubble, and flagstone. Most of the dimension stone (marble and sandstone) was mined before 1904; field stone and flagstone have been mined mostly since about 1952. Bodies of volcanic rock at Middle Butte, of quartz near Randsburg, and schist at Cook Peak were the three most productive sources of stone in 1958. The total value of the building stone mined in Kern County is not determined but is probably greater than $100,000.

SPECIALTY SAND

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
527	Chalk Cliff prospect	Sec. 17, T27S, R29E, MDM, near Chalk Cliff, 16 miles northeast of Bakersfield	J. F. Williams; prospected by Lee E. Engle, 4906 Morro Drive, Bakersfield (1957)	Upper Miocene marine sand, estimated to be 100 feet thick. Dip less than 10° west. Exposed without overburden in an area of 100 acres.	Slightly consolidated sand; 90 percent minus 40 mesh; 75 percent minus 40 mesh, plus 80 mesh; 15 percent minus 80 mesh. Composed of roughly equal proportions of quartz and limonite-stained feldspar with several percent of biotite. Undeveloped.

STONE

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Allen travertine deposit				See under limestone, dolomite, and cement. Considered as a source of dimension stone in 1958.
	Antelope Valley deposit				See under limestone, dolomite, and cement.
528	Banded Rock deposit	NE¼ sec. 16, T30S, R40E, MDM. Rand dist., 3½ miles southwest of Randsburg	Max Hess, Johannesburg, and Ward McEntyre, address undetermined (1957)	East-trending pale gray rhyolitic dikes in schist. Rhyolite is pale cream-colored on weathered surface and contains concentric rings of iron-oxide stain. Probably several thousand tons of material available at surface from closely-spaced dikes which are from 4 to 10 feet wide and several hundred feet long.	Six claims. Very little development work done. Surface material is usually in form of weathered blocks. Quarrying methods would be necessary to obtain large blocks. Idle.
	Cluff Ranch marble deposit				See under limestone, dolomite, and cement.
529	Cook Peak deposit	NE¼ sec. 3, T27S, R33E, MDM, 4½ miles northeast of Bodfish, 1½ miles southeast of Lookout tower on Cook Peak.	Undetermined, 1957	Pale-colored thinly-and well-layered fine-grained metamorphic rocks. Rocks are part o. 1 to 3 mile wide belt of metamorphic rocks which occur along entire east face of Cook Peak and extend several miles to the north and south. At quarry locality the rocks selected for building stone are silvery white with faint green tint, extremely fine grained, thinly laminated, and moderately tough. Rocks split easily on folia planes and fresh surfaces have a satin-like appearance. Locally contain brown streaks and irregular splotches of brown iron oxides.	Developed by two quarries on east slope of Cook Peak. Upper quarry is 50 feet long, 20 feet wide, and 6 feet deep on west side. Lower quarry, adjacent and downslope from upper quarry, is 75 feet long, 40 feet wide, and 15 feet deep on west side. Selected layers are mined and hauled away in truck. Large proportion of waste material is dumped over edge of quarries. Intermittent mining done with portable equipment when stone is needed. Reported by lookout on Cook Peak to be used as facing stone. Production undetermined but probably few hundred tons by end of 1957. Some of this type of rock sold locally in Bodfish-Isabella area.
	Groover Mining and Milling Co. prospect			Tertiary welded tuff breccia.	See text under roofing granule materials.
530	J and L claim	Reported in NW¼ sec. 18, T29S, R38E, El Paso Mts., 7½ miles north-northeast of Cantil, in tributary cyn. to Last Chance Cyn. (1956); not confirmed, 1958	J. H. Crowley, P. O. Box 605, Ridgecrest (1956)	Buff, mustard, and yellow jasperoid or silicified tuffaceous rock of the Ricardo formation. Extent of source material undetermined. Rocks of Ricardo formation crop out in the general area; strike north-northeast and dip 20° to 30° NW. Interlayered with basalt flows.	Owner reported in May 1956 that he was marketing the stone in the form of rectangular blocks for use in honing saw blades.
	Kern Development Syndicate quarries	Reported in sec. 14, T32S, R34E, MDM, 8 miles east of Tehachapi, near mouth of Oil Cyn.	Undetermined, 1958; Kern Development Syndicate (1916) (address undetermined)	Aubury (1906, p. 128) reports that sandstone, in green, blue, red, tan, and drab colors occurs in sedimentary layers ranging from 3 to 30 feet in thickness and dipping about 10°. The strata crop out in an area of several square miles.	Uncorrelated old name. Stone reported to be in unlimited quantities (Aubury 1906, p. 128). It was used in the Pasadena library building, and the Date and Fish buildings in Los Angeles prior to 1906. Long idle. Probably same rocks that are mined for roofing granules. (Aubury 06:128; Brown 16:522; Tucker 21:314; 29:76).
	M and M Mining Co.				See text under crushed stone for roofing granule materials.
531	Mary deposit	Center E½, sec. 30, T30S, R36E, MDM, in Jawbone Cyn., 6½ miles northwest of Cinco	Undetermined, 1957	White to cream-colored rhyolite plug several tens of feet wide and high on south side of Jawbone Canyon and several small vertical rhyolite dikes on north side of canyon. Brown iron-stained rhyolite in dikes and border of plug. The average size of loose stones at base is about 6 inches in maximum dimension, but blocks several feet in diameter could be mined from plug. Several tens of thousands of tons of rhyolite available in area; may not be iron-stained throughout.	Rhyolite with moderate amount of iron-staining selectively mined from a pit about 6 feet wide and 10 feet long. Probably yielded a few tons or stone (rubble) in 1956 or 1957. Idle.
	Pescado Creek deposit				See Antelope Valley marble deposit under limestone, dolomite, and cement.
	San Emigdio Canyon deposit	San Emigdio Cyn., south of San Joaquin Valley	Undetermined (1958); probably on private land	Sandstone, probably of Eocene age, has been reported in San Emigdio Cyn. as early as 1906.	Probably no production. No extensive development reported. (Aubury 06:370t; Brown 16:522; Tucker 21:314).

STONE, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
532	Sweetheart deposit	NE¼ sec. 10, T28S, R39E, MDM, northeast part of El Paso Mts., 9½ miles south-southeast of Inyokern	Fred and Ora Bower, Inyokern (1957)	Hard, white, fine-grained sedimentary layer from 5 to about 8 feet thick, interlayered with fine- to coarse-grained Tertiary sedimentary and volcanic rocks. The rocks strike N., dip about 25° E., and are exposed in two 300-foot-long shallow pits about 1,500 feet apart along strike. A sample of the white material analyzed by x-ray diffraction consisted of approximately 25 percent dolomite and 75 percent poorly crystalline or amorphous material (J. A. Pask, personal communication, 1958).	Six unpatented claims. Overburden has been removed with bulldozers and rock has been explored in shallow open pits. Strata dips into hill so overburden increases down dip. Rocks can probably be mined from surface for about 3,000 feet along strike and perhaps for 1,000 feet along dip around north end of hill. Material has been considered for use as roofing granules and may have applications as a white filler. Idle.
533	You-Name-It deposit	Center E½ sec. 26, T30S, R36E, MDM, Jawbone Cyn., 3 miles northwest of Cinco	Cole Watson, Lyle Percies, Fred Walker, W. P. Yow, Jr. (1957)	North-striking, gently west-dipping, silicified, iron-stained, white, coarse- to fine-grained nonmarine Tertiary sedimentary rocks composed mostly of volcanic debris. Rocks crop out continuously for about 2 miles and are about 50 feet in average thickness.	Small amounts of stone with concentric iron stains have been mined since 1954 for use as building stone. Idle. See also Big Four prospect under Silver.
	Unnamed	Vicinity of Randsburg		Evenly-foliated and well-foliated micaceous schist. It most commonly dips less than 45°.	Micaceous schist ranging in color from pale gray to dark gray-green crops out in a large part of the Rand Mountains and in many places can be quarried to obtain slabs and flat-sided blocks suitable for facing stone. It splits easily along planes parallel to the foliation and slabs with a minimum surface area of 6 square feet can probably be obtained.
	Unnamed	Vicinity of Randsburg		White, milky quartz veins as much as 5 feet wide and 20 feet long in schist.	In 1957 and 1958, quartz was being obtained by undetermined persons from several outcrops of quartz veins within 2 or 3 miles or Randsburg and marketed as ornamental or rubble stone. Probably several tons of quartz has been obtained from the outcrops of the veins. Stones probably have a maximum dimension of 1 or 2 feet and each vein probably yields an average of less than 1 ton of stone.
	Unnamed	El Paso Mts.		The Mesquite schist and slaty strata of the Garlock series (Dibblee, 1952, p. 14-19) which crop out in many parts of the El Paso Mts. are suitable sources of flat stone.	Schist and slate, most commonly pale green in color, have been used locally as facing stone. They cleave into slabs of convenient thickness as much as several feet across. (Dibblee, Gay 52:47).
	Unnamed	Vicinity of Randsburg		Mariposite, an apple green micaceous mineral, occurs in pale tan dolomite rocks in which it constitutes as much as 15 percent of the rock. It occurs as lenses along faults. Largest known occurrence is at Rainbow claim (see under gold).	Probably could be utilized as a polished facing stone. No known production of this type of rock from the Rand district.

Descriptions of marble deposits are in the tabulated section under *Limestone, Dolomite, and Cement*. Descriptions of other stone deposits are in the tabulated section under *Stone*.

Marble: An undetermined amount of pale carbonate rock for use as dimension stone and rubble was obtained from deposits in the Tehachapi Mountains (Antelope Valley and Cluff Ranch deposits), but since 1910, the deposits have been inactive. Another deposit 7 miles southwest of Tehachapi was also a source of dimension stone about 1886. No other deposits of carbonate rock have been productive sources of dimension stone, but masses of pale limestone and dolomite in roof pendants in the Sierra Nevada, the Tehachapi Mountains, and in the mountains north of Frazier Park are sufficiently large to be developed. Most of these deposits, however, are too distant from rail transportation, are not of currently popular colors, or are too highly fractured to yield large blocks for cutting. Carbonate rocks, mostly pale gray to white, near Weldon, Claraville, Frazier Park, in Erskine Creek, and at several localities in the Tehachapi Mountains, are suitable for rubble and roofing granules. The Allen travertine deposit, near Bodfish, was investigated in 1958 as a source of dimension stone, but was not mined.

Sandstone: Kern Development Syndicate quarried several colors of Tertiary sandstone in an area 8 miles east of Tehachapi during the early 1900s. The sandstone deposits are probably some of the same ones being mined in 1958 for roofing granules (see under *Roofing Granule Material*). Unquarried outcrops of marine sandstone, probably Eocene in age, in San Emigdio Canyon have been cited since 1906 as sources for obtaining sandstone. No extensive development of these sources, however, has been reported.

Other Rocks: White quartz has been obtained in recent years from veins in the vicinity of Randsburg and mar-

keted as rubble. Darkly stained volcanic rubble or field stone was being obtained in 1958 from the northeast slope of Middle Butte (Mojave Color Rock Products) and masses of iron-stained rhyolite rocks in Jawbone Canyon (Mary deposit) have yielded a few tons of rubble. Large, undeveloped reserves of iron-stained rhyolite are held by mineral location at several places in Jawbone Canyon and southwest of Randsburg (Banded Rock Claims). Rhyolite rock at Groover quarries (see *Roofing Granule Material* section) has been evaluated for use as stone. Only one deposit of schist (Cook Peak deposit) was being mined in 1958 although schist near Randsburg, in El Paso Mountains, and probably at several places in the Sierra Nevada is probably suitable for flagstone.

Sedimentary rocks made up largely of volcanic debris, which have been the principal source of roofing granule material, are potential sources of rubble (see *Roofing Granule Material*).

Sulfur

Scattered small deposits of sufur-bearing material have been prospected since 1891 in the Sunset oil district east of Maricopa (fig. 97). Sulfur is found as cement in alluvium, and as cement and disseminated crystals in sedimentary rocks containing gypsum and clay. The deposits are listed below in the tabulated list of sulfur deposits.

The total production of sulfur-bearing material, which occurred principally in the 1920s, is undetermined, but probably is less than 400 tons. The depth and lateral extent of the several exposures of sulfur also are undetermined, but probably the deposit is limited to a depth of only a few feet over a total of approximately 20 acres. The average sulfur content of this material is less than 5 percent (P. A. Lydon, personal communication, 1958).

Talc

At least five talc deposits have been explored in the Rand district and other deposits could be developed in that area should a demand for the talc arise. No talc had been produced from Kern County by 1959. The deposits are listed below in the tabulated list of talc deposits.

In the Rand mountains, mostly from 2 to 5 miles southwest of Randsburg, talc is in layers in Rand schist. The layers are as much as 6 feet thick and several tens of feet in exposed length. Most of the layers are composed of varicolored talc, which may be in part composed of other soft materials, and some layers contain abundant prismatic crystals of actinolite. The talc ranges in color from white, to pale green, and gray. Some layers contain a moderate amount of iron oxides.

Talc in these deposits is probably suitable for use in markets commonly supplied by soapstone and pyrophyl-

SULFUR

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
534	Gasko group	Sec. 33, T31S, R22E, MDM, 4 miles west of Fellows, northeast side of Temblor Range	George Mezo, R. H. Kirkpatrick, Leon Sutliff; leased to Crown Uranium Co., Taft (1959)	See tabulation entry in uranium section.	Sulfur-bearing material reported (Eng. and Min. Jour., April 1959, p. 143) sold to Brimstone Sulphur Co., Oildale, for soil conditioner.
	Hambleton prospect				Claim holder in 1893. See Maricopa prospect. (Aubury 06:372; Watts 93:233).
	Koskmyre prospect				Claim holder in 1893. See Maricopa prospect. (Watts 93:233).
535	Maricopa (Ramey, Hambleton, Koskmyre) prospect	N½ sec. 28, T11N, R23W, SBM, Sunset oil dist.	Undetermined, 1958	Disseminated crystals of sulfur and gray amorphous sulfur as cement in shallow soil and alluvial drift. Average sulfur content of soil and drift less than 5 percent. Clay and impure gypsum beds crop out locally. Areal extent of sulfur-bearing material undetermined but probably about 20 acres.	Active before 1891. Minor production during early 1920's. Small open cut and shallow pits developed about 1957, but no recent production reported. (Aubury 04:19t; 06:372t; Brown 16:522; Crawford 94:410; Lydon 57:615; Tucker 29:76; Watts 93:233; 94:33).
	Ramey prospect				Claim holder in 1893. See Maricopa prospect. (Watts 93:233).
536	Sulphur mine, The	Reported in sec. 10, T10N, R23W, SBM, Sunset oil dist. (1904); not confirmed, 1958	Undetermined, 1958; C. B. Green, San Francisco (1904)	Sulfur deposit between "walls of shale and sandstone".	Uncorrelated old name; probably long abandoned prospect (Aubury 04:19t; 06:372t).
	Sunset Co. prospect				Lessee of deposit in 1906. See Maricopa prospect. (Aubury 06:327t).
	Western Minerals prospect				Claim holder in 1904. See Maricopa prospect. (Aubury 04:19t).

TALC

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	B. H. P. mine	Rand Mts.		Impure talc in schist in area few tens of feet northwest of manganese occurrence.	Overburden removed with bulldozer. See also in manganese section.
537	Desert View prospect	N½ sec. 22, T30S, R40E, MDM, Rand dist., 4 miles south-southwest of Randsburg, on south flank of Rand Mts.	Dennis R. Rivers, P.O. Box 139, Beverly Hills (1957)	Approximately 6-foot-thick layer of gray to white talcose material in layered mica schist. Layer strikes N. 80° W., dips 35° S., and is exposed for about 40 feet along strike. Another layer of impure talcose material exposed about 40 feet higher in section.	A prospect developed by 20-foot inclined shaft. Idle.
	Gold Crown group				See under gold.
538	Roscó prospect	NE¼SE¼ sec. 9, T30S, R40E, MDM, Rand dist., 2 3/4 miles southwest of Randsburg, near crest of Rand Mts.	James R. Wood, John T. Lawson, Jr., address undetermined (1957)	Approximately 6-foot-thick layer of talcose material in layered schist. Talcose layer is poorly exposed along strike from inclined shaft, multi-colored, and contains some layers rich in bladed crystals of actinolite. Talcose layer is truncated and perhaps duplicated where intersected by faults. Strikes N. 40° W. and dips 45° SW.	Exposed in 40-foot inclined shaft. Idle.
539	Serpentine prospect	SW. corner sec. 9, and NW corner sec. 16, T30S, R40E, MDM, Rand dist., 3½ miles southwest of Randsburg, on crest of Rand Mts.	____ Bailey, address undetermined (1957)	Three- to 4-foot-thick layer of moderately pure talcose material dips 50° SW. strikes N. 40° W. Exposed on surface for few tens of feet and appears to be truncated down dip at fault. Overlain by black chert and underlain by schist. Locally contains lenses of fine-grained actinolite schist and radiating clusters of coarse-grained actinolite. Talc layer is probably repeated by fault in poorly exposed area to west.	Developed by drift adit a few feet long in south end of exposure of talc layer and by shallow pits. Layer crops out athwart northeast-trending crest of Rand Mts. Idle.
540	Tommy Knocker prospect	SW¼ sec. 15, T30S, R40E, MDM, Rand dist., 4½ miles southwest of Randsburg, on southeast side of Rand Mts.	Grace Landes, 13061 Berrydale St., Garden Grove, and Lloyd Slettebak, 17241 Stagg St., Van Nuys (1958)	Impure to moderately-pure talc in moderately to steeply-dipping layers in schist. Layers are mildly folded and faulted but crop out in an area of several acres. Most of the talc is pale to dark gray or green in layers about one foot thick and several feet long. Principal impurities are iron-oxides and elongate crystals of actinolite. Veinlets of manganese oxides occur in schist south of the talc layers and scheelite has been found in stream channels on the claims.	Two claims. Talc is exposed in a few open cuts and in areas scraped clear with bulldozer. No productions. Idle.

lite. The talc deposits, however, would have to be mined by underground methods and marketed at a price competitive with soapstone and pyrophyllite mined from open pits elsewhere in California.

Thorium and Rare Earths

Rare earth- and thorium-bearing minerals have been found at several localities in Kern County, but the deposits are either too small or too low-grade to be worked commercially.

Monazite, a phosphate of rare earths which commonly contains thorium, is the source of most thorium used in the United States (Paone, 1958, p. 1151) and is the source of by-product rare earths. In Kern County it is a minor accessory mineral of Mesozoic granitic rocks. It is also one of the constituents in black sand placer deposits derived from the granitic rocks and is in greater proportions in the sands than in the granitic rocks. Neither the granitic rocks nor placer deposits have been cited as

THORIUM

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
541	Wilkerson No. 1 prospect	NW¼ sec. 33, T26S, R38E, MDM, 5 miles west of Inyokern, ½ mile west of U. S. Highway 6	Clark L. and Virginia Wilkerson, address undetermined (1956)	Radioactive bones in coarse conglomeratic arkose and sandstone of probable Pliocene age. Radioactivity caused by thorium in francolite, a variety of apatite, which is a replacement of bone material (D. F. Hewett, personal communication).	Adjacent to Los Angeles aqueduct on east flank of Sierra Nevada. Developed by open cut at point of discovery. Not a commercial source of thorium. Idle.

containing any unusually rich concentrations of monazite.

Allanite, a basic calcium-iron-aluminum cerium silicate, is a minor accessory mineral in hornblende quartz diorite near Breckenridge Mountain (Dibblee and Chesterman, 1953, p. 23) and is probably an accessory mineral in other granitic rock masses elsewhere in Kern County.

Radioactive bones at a locality in northeastern Kern County (fig. 99) were prospected in 1955 as a source of uranium. The radioactive material was subsequently identified by the U. S. Geological Survey (D. F. Hewett, personal communication, 1956) as francolite—a thorium-bearing variety of apatite—which had replaced the bone. The deposit is not presently of commercial interest.

Anomalous radioactivity attributed to the presence of cyrtolite, a uranium- and rare earth-bearing variety of zircon, was noted by the writers in a pegmatite dike in the Clear Creek district.

Tin

Tin was discovered in Kern County in 1940 by Willard Mallery at the Gray Eagle (Discovery) prospect near the headwaters of Alamos Creek, southwestern Tehachapi Mountains (fig. 99). Mallery subsequently discovered several other prospects in the same general area, now known as the Gorman tin district. Other mines in Kern County in which tin has been found are listed in table 25. The largest deposits of tin were discovered at the Meeke iron prospect. Here some grains and crystals of cassiterite (SnO_2) are as much as half an inch in diameter, but most grains are too small to be seen without magnification. The cassiterite is in gossan and iron-rich tactite as aggregates forming veins, pods, and lenses, commonly a few inches in maximum dimension.

The largest ore shoot is at the Meeke mine in the west end of a gossan body. Reserves for the entire district, as estimated by the U. S. Geological Survey and U. S. Bureau of Mines (Wiese, 1950, p. 46), are shown below.

	Percent tin	Tons
Ore in place	1.0 to 2.0	3,740
Ore in place	0.5 to 1.0	3,450
Ore in place	0.1 to 0.5	25,600

	Pounds tin per cu. yd.	Cu. yds.
Placer materials	15-30	800
Placer materials	3-15	2,460
Placer materials	1.5	10,000

*Meeke (Hogan, Hogan-Mallery, Meek-Hogan) Mine.** Location: SW¼ sec 25, T. 9 N., R. 18 W., S.B.M. (proj.), 7 miles east of Lebec, low on the southeast flank of the southwest end of the Tehachapi Mountains. Ownership: The mine is on private land owned by Tejon Ranch Co., P.O. Box 1560, Bakersfield (1959).

Cassiterite was discovered by Willard Mallery in 1942 at a locality then known as the Meeke iron prospect. The site had been previously prospected, on a small scale, for iron and gold. The deposit was investigated subsequently by the U. S. Geological Survey and sampled and drilled by the U. S. Bureau of Mines at various times between

* Compiled mostly from a description by Wiese and Page, 1946, p. 31-52.

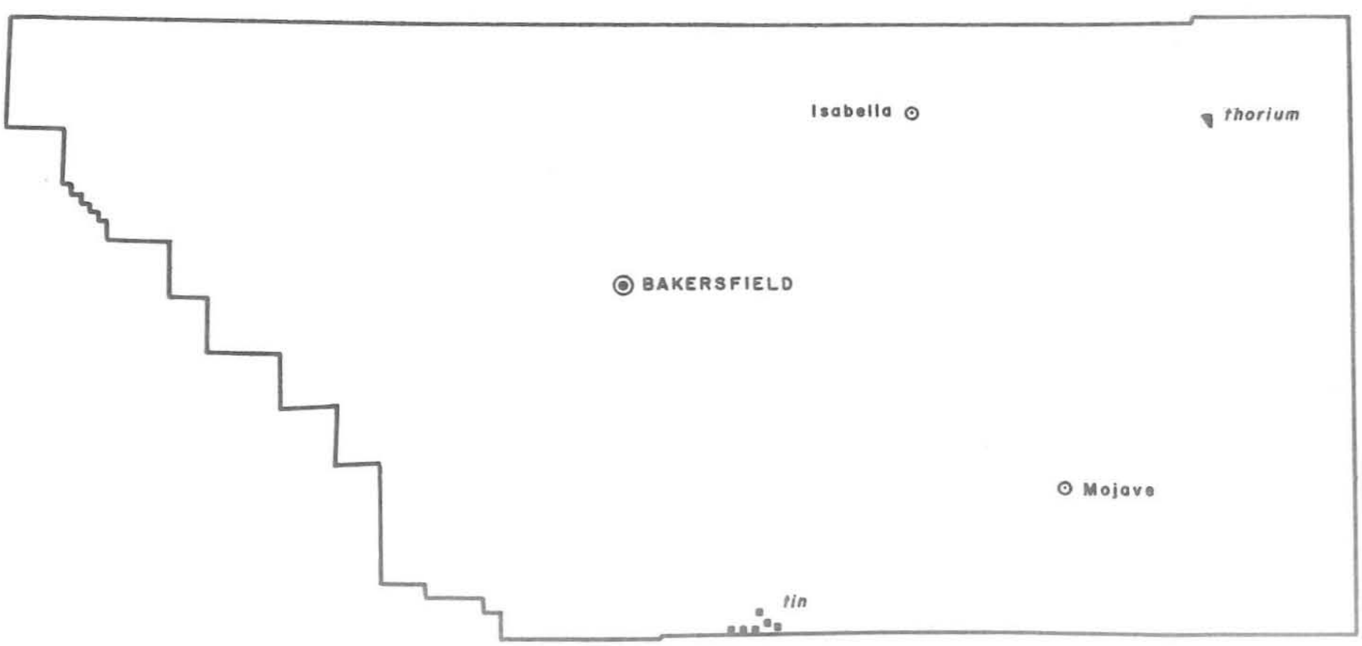


Figure 99. Distribution of thorium and tin deposits in Kern County.

Table 25. Mines and prospects in Kern County examined for tin in a survey in California by R. H. Bedford and F. T. Johnson.

(U. S. Bureau of Mines Report of Investigations 3876, 1948.)

	Location				Type of mine	Assay results		Type of rock	Tin minerals noted
Name	Sec.	T.	R.	B&M		(lbs. tin per ton)			
Lucky Three	1	28S	33E	MD	Tungsten	(1) (2) (3) (4) (5)	4.2 0.6 0.4 1.8 1.4	Tactite Altered granite Fault breccia Iron-rich material Iron-rich material (?)	None
Jennette Grant	1	28S	33E	MD	Gold	(1) (2)	12.0 0.8	Selected ore Grab from dump	Cassiterite
Iconoclast	25	27S	33E	MD	Gold and silver	None made			None
Unnamed	5	27S	33E	MD	Gold	None made			None
Black Jack	26	26S	33E	MD	Lead and zinc		2.2	Selected dump material	None
Rocky Point	22	27S	35E	MD	Tungsten (?)		1.4	Selected dump material	None
Big Blue	28	25S	33E	MD	Gold	(1) (2)	2.0 0.6	Jig concentrated Flotation product	None None
Mammoth	35	26S	32E	MD	Gold	None made			None
Pennsylvania	35	26S	32E	MD	Gold		1.8	Mill concentrates	None
Keyes	26	27S	32E	MD	Gold		0.6	Mill concentrates	None
Mary Ann	8	27S	33E	MD	Tungsten (?)		0.8	Tactite	None
Unnamed	31	25S	33E	MD	Unstated	None made			None
Meeke	25	9N	18W	SB	Tin	See description in text		Iron-rich tactite	Cassiterite
Crowbar Gulch	34	9N	18W	SB	Tin	(1) (2)	17.0 2.0	Iron-rich tactite Iron-rich tactite	Cassiterite Cassiterite
Butler	30	9N	17W	SB	Tin	None made			
Dunton	34	9N	18W	SB	Tin	None made			
Golden Queen	6	10N	12W	SB	Gold and silver		0.4	Quartz containing sulfides	None
Treasure Island	7	10N	12W	SB	Gold	None made			None
Gold Bug	35	27S	40E	MD	Gold	None made			None
El Dorado	34	27S	40E	MD	Gold	None made			None
Greenback	1, 2, 3	26S	29E	MD	Copper		2.6	Granodiorite	None
Iron Mountain	9, 10	26S	29E	MD	Iron	(1) (2) (3)	0.4 1.8 1.6	Granodiorite Granodiorite Granodiorite	None None None

1943 and 1945. Three shipments of high-grade tin ore, gathered mostly from surface boulders near the deposit, were sold during 1943, 1944, and 1945. The three shipments totaled 6.7 tons of ore averaging 39.42 percent of tin. The mine has been idle since 1945.

The Meeke tin deposit is the largest of several iron-rich tactite and gossan bodies at the margins of limestone bodies in granitic rocks along the southeast flank of the Tehachapi Mountains. The limestone is the most abundant rock type in a succession of pre-Cretaceous metasedimentary rocks which also includes hornfelses, quartzite, and schist (fig. 100). In the general vicinity of the mine these rocks strike northeast, dip northwest, and appear to be only a few hundred feet thick. The rocks appear to form a flat roof over granitic rocks of Mesozoic age (Wiese and Page, 1946, p. 34). The limestone, normally blue to bluish-white and coarsely crystalline, is white and fine grained near the granite.

The Meeke deposit consists of two cassiterite-bearing, iron-rich bodies 100 feet apart, in bleached limestone. The bodies, designated the "West gossan" and "East gossan," are composed mostly of silicified hydrous iron

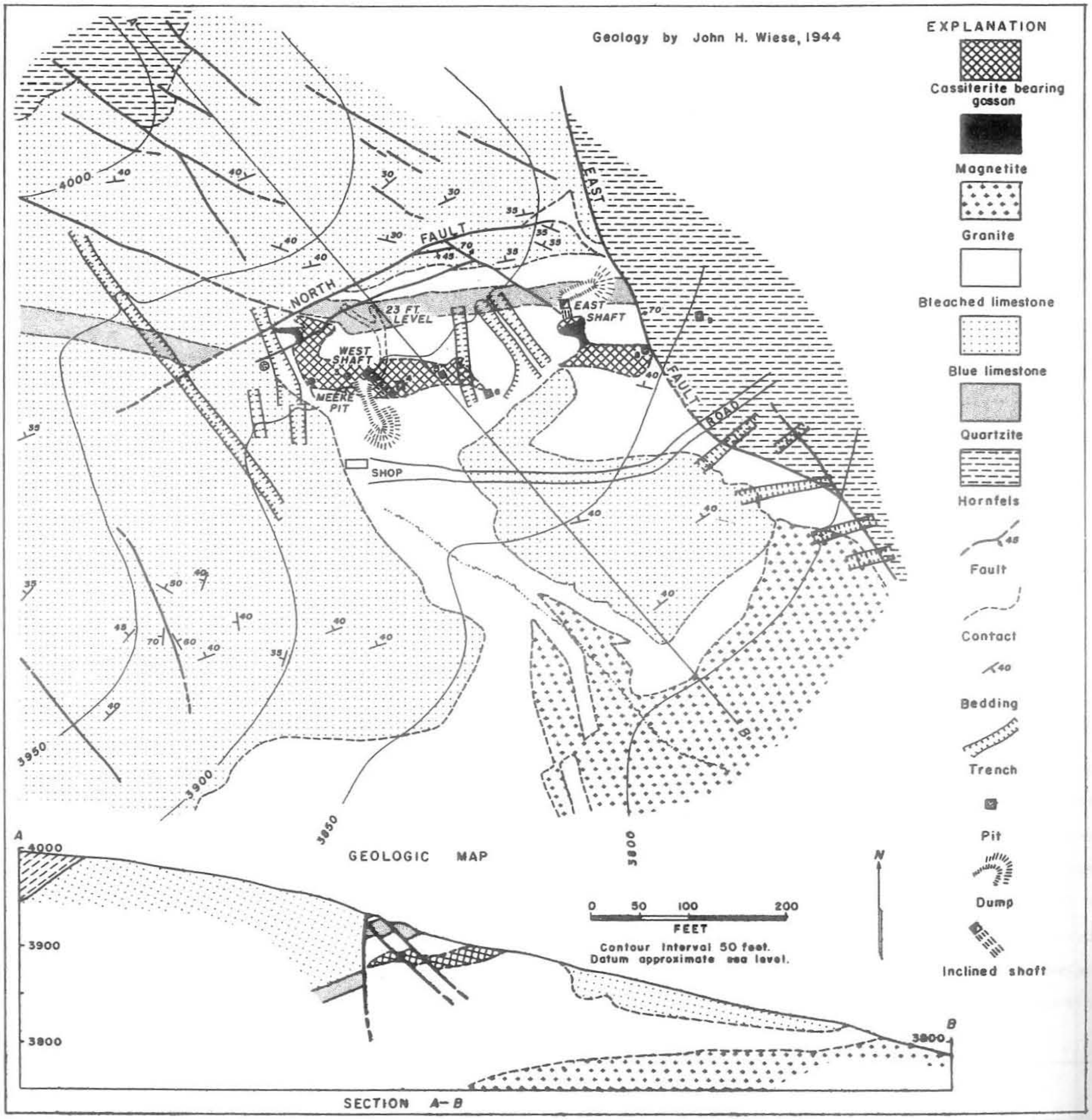


Figure 100. Geologic map of the Meeke tin mine.

TIN

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
542	Crowbar Gulch prospect	NE¼SE¼ sec. 34, T9N, R18W, SBM, (proj.), 6 miles east of Lebec, near west end of Antelope Valley, southeast flank of Tehachapi Mts.	Tejon Ranch Co., P.O. Box 1560, Bakersfield (1958)	Prospect includes 13 tin-bearing tactite bodies along about 1,500 feet of a west-trending contact between limestone and granite. Largest body is about 300 square feet in areal extent; smallest body covers only a few tens of square feet. Average tin content of largest body (4,000 tons) is reported to be about 0.3 percent of tin; the next largest (1,000 tons) is about 0.8 percent of tin; and the 11 small bodies (1,200 tons) about 0.3 percent of tin (Wiese and Page 46: 50-51). Principal tin mineral is cassiterite; some tin may be in ludwigite. Magnetite forms as much as 40 percent of some of the garnet-epidote tactite, and scheelite occurs in part of the largest tactite body.	Developed by shallow prospect pits and shallow trenches. Cassiterite discovered in 1943. (Wiese, Page 46:49-51).
	Discovery prospect				See Gray Eagle prospect (Wiese, Page 46:51).
543	Dunton prospect	SW¼ sec. 34, T9N, R18W, SBM, (proj.), 5½ miles east of Lebec, in foothills at western end of Antelope Valley, southeast flank of Tehachapi Mts.	Tejon Ranch Co., P.O. Box 1560, Bakersfield (1958)	Magnetite tactite on north edge of a limestone salient in granite. Seven samples taken by Willard Mallery in 1940's contained from 3.15 percent tin to no tin (Wiese and Page, 1946, p. 52).	Originally developed as an iron prospect. Tactite exposed in two bulldozer trenches. Idle; no production. (Wiese, Page 46:52).
544	Gray Eagle (Discovery) prospect	NE¼ sec. 23, T9N, R18W, SBM (proj.), 7 miles east of Lebec, at head of Alamos Cr., southeast flank of Tehachapi Mts.	Undetermined, 1958; Willard Mallery and Dana Hogan (1946), deceased	Iron-rich tactite body about 6 feet long and 18 inches wide contains as much as 3 percent tin by assay (Wiese and Page, 1950, p. 52). Tactite body is in limestone adjacent to granite. Contains magnetite, ludwigite, maghemite (an altered amphibole), arsenopyrite, molybdenite, and cassiterite. The cassiterite occurs as finely disseminated grains. Magnetite float in gulch upstream from this body suggests presence of other bodies.	Original discovery site of tin in Gorman dist. Prospect is in public domain within boundaries of Tejon Ranch property. Developed by shallow pit. No production. (Wiese 50:46; Wiese, Page 46:51-52).
	Hogan mine				See Meeke mine in text (Bedford, Ricker 49:1-10).
	Hogan-Mallery mine				See Meeke mine in text. (Tucker, Sampson, Oakeshott 49:238-239, 271t).
545	Lower Butler prospect	SW¼ sec. 30 T9N, R17W, SBM (proj.), 8 miles east of Lebec, low on southeast flank of Tehachapi Mts.	Tejon Ranch Co., P.O. Box 1560, Bakersfield (1958)	Two iron-rich tactite bodies in bleached limestone adjacent to granite. Tactite consists mostly of massive brown garnet, and small but variable proportions of fine-grained magnetite, hematite, and limonite. Traces of copper-oxide minerals occur in fractures. Tin content of tactite and float ranges from 1.9 percent of tin to a trace (Wiese and Page, 1950, p. 51).	Tactite bodies prospected by two shallow bulldozer cuts and 5 small pits. No production. (Wiese 50:46; Wiese, Page 46:51).
546	Meeke (Hogan-Mallery, Meek-Hogan) mine	SW¼ sec. 25, T9N, R18W, SBM (proj.), 7 miles east of Lebec, on southwest flank of Tehachapi Mts.	Tejon Ranch Co., P.O. Box 1560, Bakersfield (1958)	Cassiterite in gossan.	See text. (Bedford, Johnson 46:2-3; Bedford, Ricker 49:1-10; Mallery 44: various pages; Tucker, Sampson, Oakeshott 49:238-239, 271t; Wiese 50:46; Wiese, Page 46:37-46).
	Meek-Hogan mine				See Meeke mine in text.(Tucker, Sampson, Oakeshott 49:238-239, 271t).
547	Upper Butler prospect	NW¼ SW¼ sec. 30, T9N, R17W, SBM (proj.), 8 miles east of Lebec, low on southeast flank of Tehachapi Mts.	Tejon Ranch Co., P.O. Box 1560, Bakersfield (1958)	Four bodies of cassiterite-bearing gossan formed by oxidation of iron-rich deposits occur at a contact of limestone and granite. The largest body is 150 feet long, 15 to 60 feet wide, and about 30 feet thick. It contains an estimated 2,300 tons of material averaging betwen 0.5 and 1.0 percent of tin. The three other bodies contain about 150 tons of material averaging 0.5 percent of tin (Wiese and Page, 1950, p. 49). The bodies consist mostly of jaspery limonite, magnetite, red and brown iron oxides, and red and green clayey material. Colorless tourmaline, micaceous minerals, and cassiterite are present in small proportions.	Cassiterite was discovered in 1942 subsequent to prospecting the tactite for iron. Developed by several trenches and pits. Idle; no production. (Wiese 50:46; Wiese, Page 46:47-49).

oxides and locally of magnetite. The West gossan, which is the larger, is about 275 feet long in a general northwesterly direction, a maximum of 40 feet in exposed width, and extends downward about 150 feet at a gentle inclination northeastward. It is hook-shaped at the surface and pinches out laterally at both ends of the long axis. The East gossan is about 100 feet long, 30 feet wide, and extends 10 or 15 feet down a gentle northward dip. The largest ore shoot is in a northeast-pitching synclinal trough at the west end of the West gossan. The ore shoot is about 30 feet long at the surface, 8 feet thick, and extends about 120 feet down the dip. The remainder of the West gossan and most of the East gossan contain a very small proportion of tin except in small high-grade pods, lenses, and veinlets, no more than a few feet in their longest dimension.

Cassiterite is the only commercial tin mineral at the Meeke mine. It is closely associated with scheelite, molybdenite, tourmaline, and phlogopite, all of which were originally deposited with cassiterite in limestone and tactite as replacement bodies. Later, limestone and tactite was replaced by pyrite which in turn was oxidized in place to form the gossan. The upper parts of the gossan bodies have been weathered and partly eroded, so that some of the alluvial debris surrounding the gossan contains cassiterite derived from the gossan. Cassiterite has been noted (1) in the limestone, (2) in the gossan, and (3) in the alluvium.

The cassiterite is in dark-brown grains, some as much as half an inch in diameter; but most are very small and are obscured by a coating of iron oxides. Aggregates of cassiterite grains are in veins and pods, some of which contain as much as 50 percent tin by assay, but generally are at most only a few inches in maximum dimension. Associated primary minerals are magnetite, pyrite, epidote, garnet, scheelite, molybdenite, chalcopyrite, arsenopyrite, galena, powellite, phlogopite (vermiculite), tourmaline, strontianite, zoisite, apatite, quartz, and calcite. The secondary minerals are hydrated iron oxides, cuprite, malachite, chrysocolla, jarosite, gypsum, chalcedony, opal, native copper, clay minerals, and an unidentified secondary zinc mineral. Host rocks generally contain more than one of these minerals, but nowhere have all of them been found together.

The mine workings consist of 14 shallow shafts and 17 trenches. In addition, 11 diamond drill holes, totaling about 1,000 feet, were sunk. The West shaft, in the approximate center of the West gossan, is 45 feet deep on an incline of 65° S. 35° E. On the 23-foot level a "Y"-shaped drift with a total of 105 feet of workings was driven north and north-northwest from the shaft. At the bottom of the shaft an 18-foot crosscut was driven S. 15° E. The East shaft, 210 feet east of the West shaft, was sunk 50 feet at an inclination of 75° S. A 23-foot crosscut was driven southeast from the bottom of the shaft.

The following reserve estimates are summarized from Wiese and Page (1946, p. 45). In the West gossan the known ore shoot is estimated, on the basis of diamond drilling, to contain at least 1,440 tons of material which averages 1.68 percent of tin. Geological features, plus assays, suggest that an additional 1,000 tons of gossan, at the edges of this body, might contain about 1 percent of tin. The main body of gossan, exclusive of the ore shoot, probably contains 20,000 tons which would assay about 0.1 percent tin, but in which small, higher-grade pods and lenses may be found.

The East gossan is estimated to contain 700 tons of iron oxides of which 300 tons are estimated to contain 2 percent of tin. The remainder of the body probably contains about 0.1 percent tin, although higher-grade pods may be found.

The placer reserves are estimated to be 800 cubic yards containing 15 to 30 pounds, 2,460 cubic yards containing 3 to 15 pounds, and 10,000 cubic yards containing 1.5 pounds of tin per yard.

Tungsten

The first tungsten ore mined in Kern County consisted of fragments or "spuds" of scheelite obtained in 1905 from placer deposits in the "Stringer" portion of the Rand district about 1¼ miles north-northwest of the prolific Atolia tungsten district, which lies almost wholly in San Bernardino County. These were collected from an area, a few square miles in extent, in the southeastern part of the Rand district. Scheelite subsequently was found elsewhere in the Rand district in numerous veins commonly called "stringers" because of their narrow width and short lateral and vertical extent. From 1914 through 1918, a war stimulus and very high prices led to numerous discoveries of tungsten deposits many of which were in contact metamorphic rocks in the southern Sierra Nevada. Tungsten mining ceased from 1920 to 1928 following a decrease in the price, and only modest amounts of tungsten ore were produced annually from Kern County sources between 1929 and 1950 when sources in China became unavailable to U. S. markets. Many of the deposits listed in this report were discovered during the period from July 1951 to July 1956 when the U. S. General Service Administration was purchasing tungsten concentrates at a price of $63 per short ton unit of contained WO_3. Annual tungsten production in Kern County was reduced to practically nothing after the purchase program was discontinued in mid-1957.

Complete production statistics for tungsten are not available but concentrates valued at more than $1.5 million are credited to Kern County sources.

Most of the tungsten mines in Kern County are in two areas (fig. 101): (1) the Sierra Nevada and (2) the Rand district. Most of those in the Sierra Nevada are in the southern part of a tungsten-rich belt 200 miles long on the western side of the Sierra Nevada. The tungsten mineralization is of contact metamorphic origin and is in bodies of complex lime-silicate mineralogic assemblages (tactite) along and near margins of roof pendants in Mesozoic granitic rocks. Scheelite ($CaWO_4$) is usually

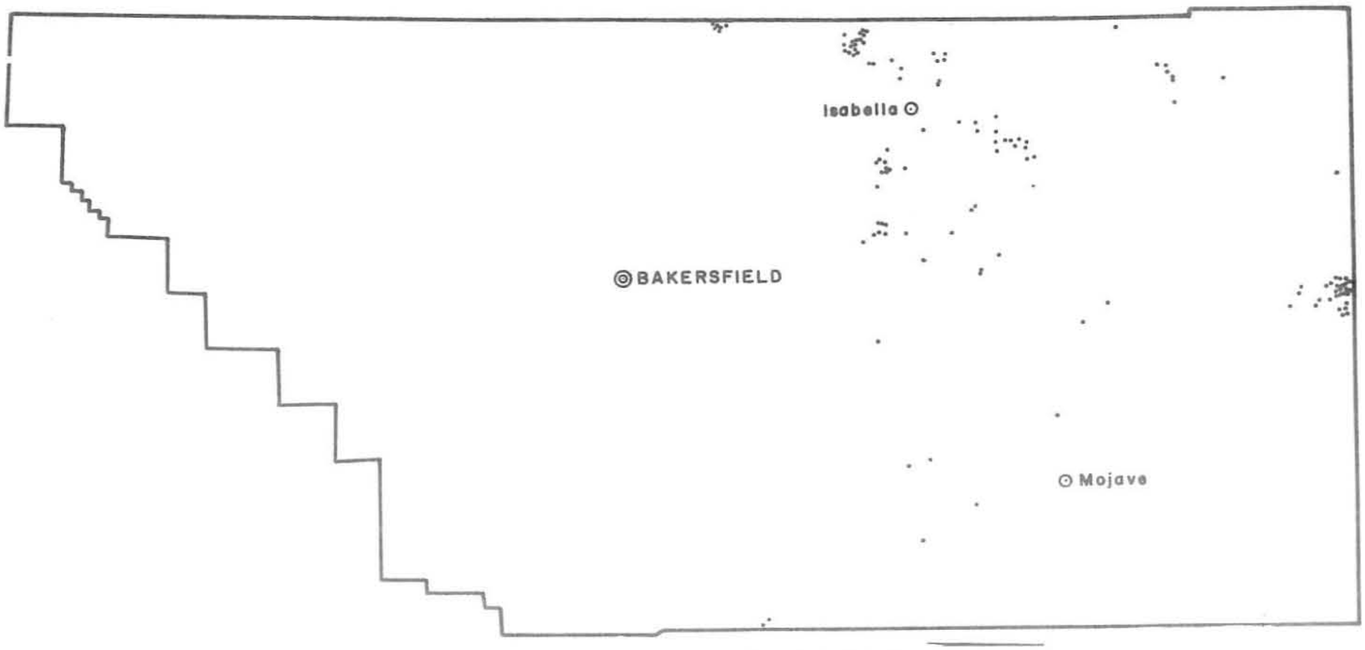


Figure 101. Distribution of tungsten deposits in Kern County.

the only tungsten ore mineral present and is the one most sought. Powellite ($CaO.(Mo,W)O_3$) is common in some deposits. The gangue minerals generally include quartz, garnet, epidote, calcite, and diopside with lesser amounts of pyrite, pyrrhotite, chalcopyrite, and molybdenite. Wollastonite and tremolite are present in many of the pale-colored silicate zones which commonly border the tactite bodies. The two largest tungsten mines in the Sierra Nevada portion of Kern County are the Tungstore No. 2 mine near Woody and the Hi-Peak mine near Inyokern.

A few deposits in the southern Sierra Nevada are in quartz veins within granitic rock and near roof pendants. Most of these are quartz veins that contain scheelite associated with minor pyrite. They have yielded only a small proportion of the tungsten from the Sierra Nevada.

In the Rand district scheelite is mostly in quartz-calcite fissure veins in quartz monzonite and schist. These deposits occupy shear zones and were probably emplaced during late Miocene time (Lemmon and Dorr, 1940, p. 221). The ore has been mined from scheelite-rich veinlets and massive, irregular bodies of scheelite in a gangue of quartz, calcite, and minor, irregularly distributed pyrite, stibnite, and cinnabar (Lemmon and Dorr, 1940, p. 218). Some of the scheelite-bearing veins contain gold. Scheelite-bearing placer deposits formed locally of material derived from the vein deposits have also been mined. These placer deposits are in buried ancient stream channels. In these, the scheelite fragments range from less than ⅛ inch in diameter to subrounded fragments (spuds) several inches in diameter and weighing several tens of pounds.

B and F Mine. Location: SE¼NW¼ sec. 33, T. 26 S., R. 34 E., M.D.M., 3¼ miles southwest of Weldon, 2¼ miles west of Nichols Peak, near mouth of Long Canyon, Piute Mountains. Ownership: O. H. Blair, LaFern N. Coffey, and May C. Zelle own three claims (fig. 102), leased to Rene Engel and associates, P.O. Box 96, Wofford Heights (1957).

Several units of tungsten concentrates were recovered from the mined rock in 1952, 1954, and 1955. The earlier history of the mine was not discovered by the writers.

At the B and F mine, scheelite is disseminated in an elongate body of tactite along the northeast side of a roof pendant of metamorphic rocks in quartz monzonite. The tactite is composed mostly of coarsely crystalline epidote and garnet, and contains subordinate quartz and calcite. The tactite body is 3 to 10 feet wide, strikes approximately N. 50° W., dips steeply southwest, and crops out nearly continuously for about 300 feet. Locally it is crudely layered and nearly everywhere it contains closely spaced shears which trend parallel to the strike of the tactite body. The tactite body is bordered on the southwest mostly by coarsely crystalline, pale marble. Scheelite is in disseminated grains ranging in size from microscopic to ⅛ inch in diameter. The average grade of scheelite ore was not determined by the writers.

The principal mine workings are two adits driven southeast from the northwest end of the pendant. An upper drift adit extends several tens of feet S. 40° E. along the contact of marble and quartz monzonite on the northeast side of the pendant. A lower crosscut adit about 50 feet below and 100 feet west of the portal of the upper drift adit, was driven about 50 feet northeast

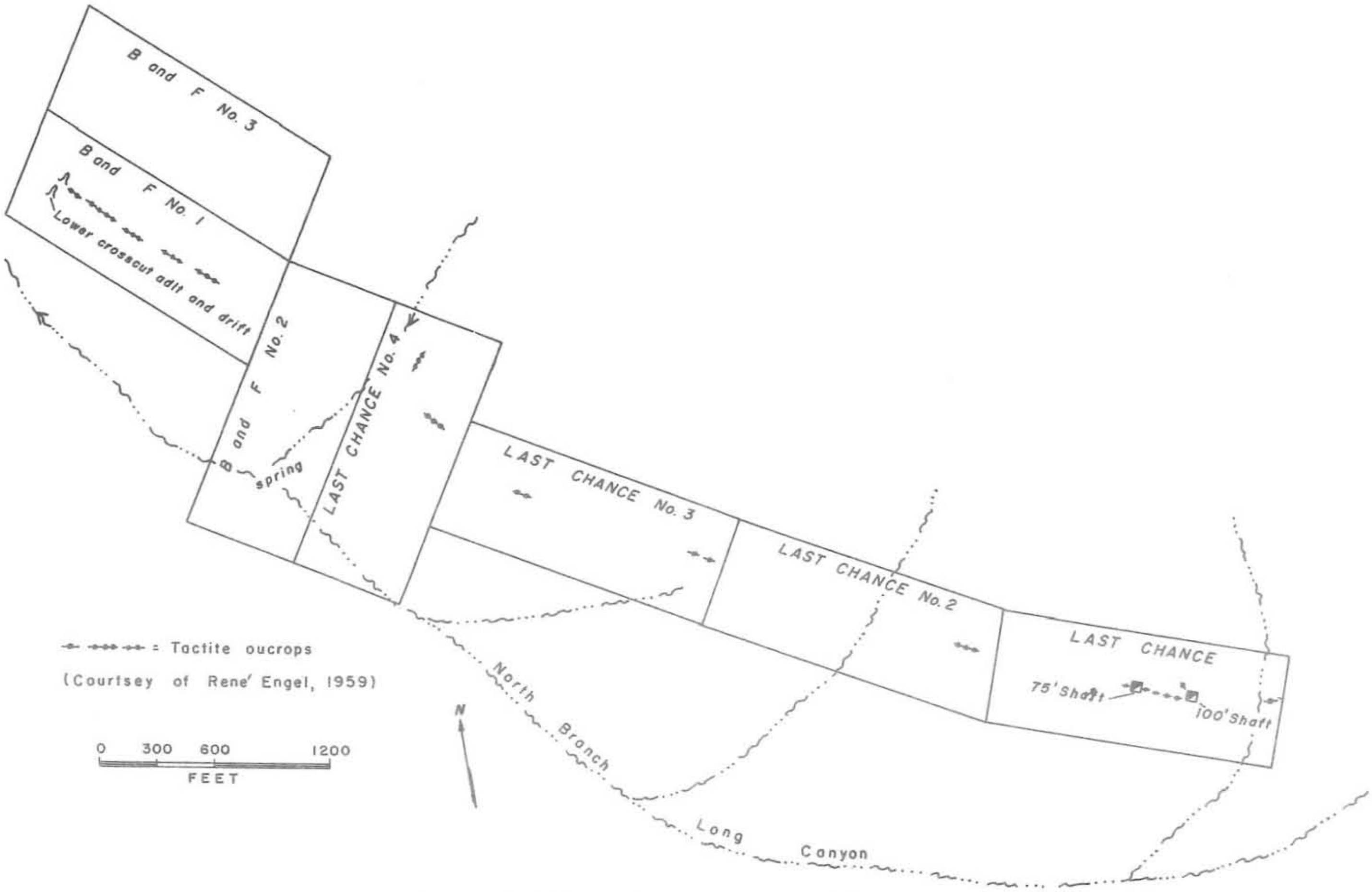


Figure 102. Claim map of the B and F and Last Chance mines.

through quartz monzonite to intersect the tactite below the upper drift adit; from this point a drift was driven 70 feet southwest along the contact between quartz monzonite and marble.

*Black Mountain King Mine.** Location: Center of sec. 27, T. 25 S., R. 32 E., M.D.M., Greenhorn tungsten district, under the power line on the north wall of Shirley Canyon, about 2 miles southeast of Greenhorn Summit. Ownership: W. S. Huckabay, c/o Greenhorn Mountain Park, Glennville, owns four unpatented claims, all under lease since 1953 to A. M. Ozanich, Jr., and T. A. Daly, Oil Center (1957).

The Black Mountain King mine yielded about 200 tons of scheelite-bearing ore during World War II, from bodies of tactite and associated fault gouge, but has been idle since. Approximately 200 tons of ore that contained 5 to 6 percent WO_3 was milled at Weldon in the early 1940s, where an 80 to 85 percent recovery was made and yielded concentrates bearing 64 percent WO_3. A mill of about 2 tons per day capacity, including a roll crusher and concentrating table, was later installed at the mine, and about 30 tons of ore from this mine and the Aldridge (Little Acorn) mine was milled with undetermined results. An assay of 2.49 percent WO_3 and 35 cents per ton in gold at the face of the glory hole was reported by the owner (1954).

Bodies of tactite, which strike north and dip steeply eastward, occur along a contact between limestone and Isabella granodiorite, and contain garnet, epidote, and scheelite. The tactite zone ranges in width from about 5 to 25 feet in the vicinity of the mine, and is bordered by a zone of sheared, clay-like gouge 35 feet wide where exposed. Well-formed, clear crystals of scheelite, some larger than one inch in diameter, occur in the gouge, and have been sought by mineral collectors. Prominent shear planes in the granodiorite strike N. 50° W., and dip steeply to the northeast.

Workings include an open cut "glory hole," about 30 feet long, 10 feet wide, and a maximum of about 25 feet deep, with a 20-foot adit driven N. 20° E. in the face. About 125 feet southeast of the glory hole a 50-foot adit was driven northeasterly, but little or no ore was removed from it.

*Buckhorn Prospect.** Location: Sec. 27, T. 28 S., R. 32 E., M.D.M., Red Mountain area, about 5½ miles south-

* By T. E. Gay, Jr.

* Most of the information in this section was obtained by R. W. Fekete from S. E. Chiapella, Mine Engineer for the Buckhorn prospect in 1954.

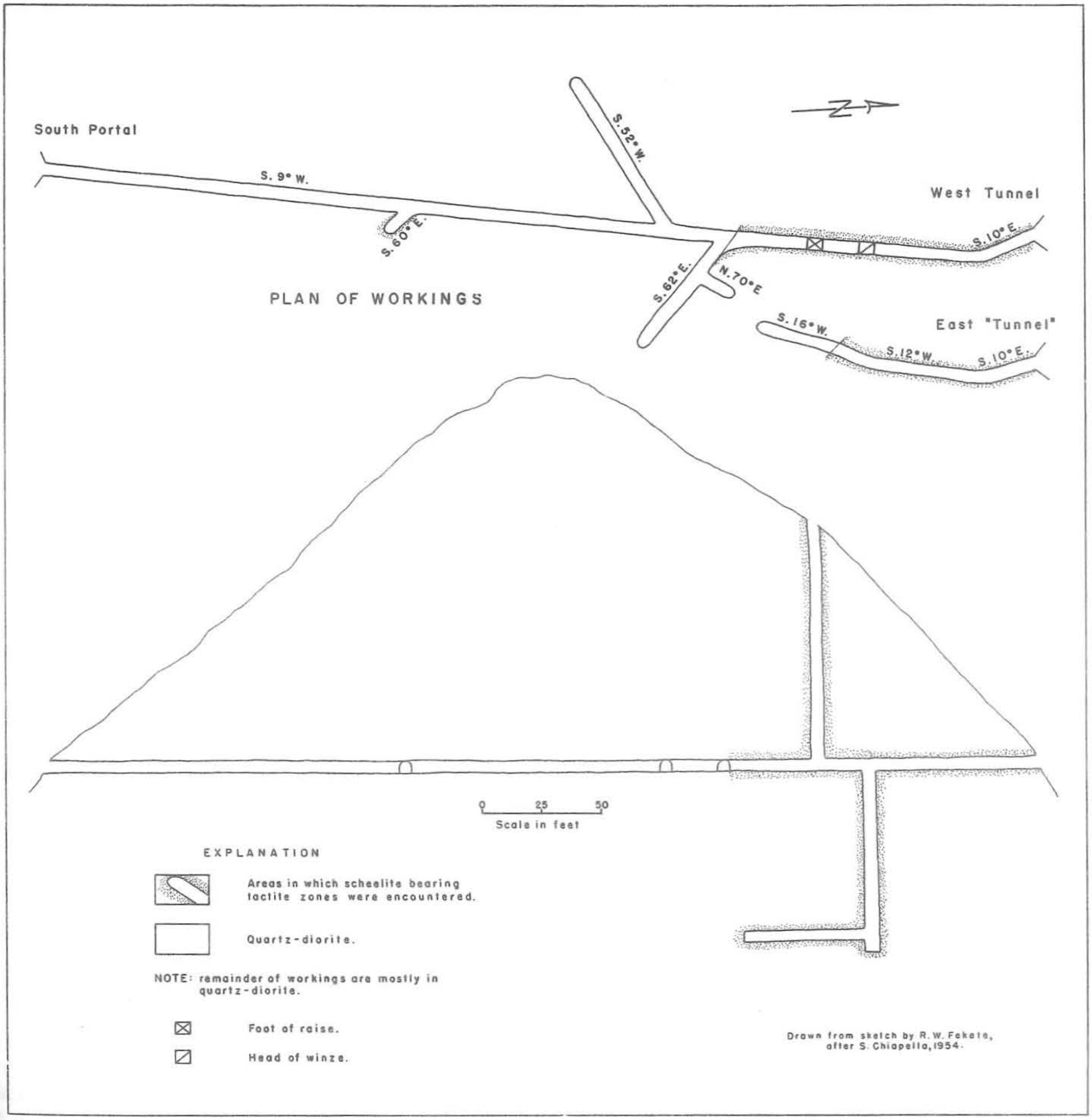


Figure 103. Plan and longitudinal section of the Buckhorn mine.

east of Havilah. Ownership: N. A. Kessler, 4528 Cockerham Drive, Los Angeles, owns seven claims (1954).

The Buckhorn prospect is a small but well-explored tungsten property. A total of about 400 tons of scheelite-bearing rock was mined but not shipped. Most or all of the development work was done in the early 1950s. The property was idle in 1958.

The mineralized area is underlain mostly by pre-Cretaceous mica schist and Mesozoic biotite quartz diorite. Numerous, approximately parallel bodies of scheelite-bearing quartz-garnet-epidote tactite are exposed along a zone several hundred feet long in the mica schist. They strike N. 10°-15° E., dip vertically, and range in width from 5 to 8 feet. One tungsten-bearing tactite body, about 6 feet wide, is in the quartz diorite. It is vertical and strikes N. 60° W.

The scheelite is in irregularly disseminated, creamy white crystals mostly 1/16 to ½ inch in diameter. Small

pockets of high-grade material have been mined, but the average grade of the material mined by 1954 was from 0.7 to 1.72 percent WO_3.

The most extensive working on the property is the West Tunnel, which was driven 450 feet southward along one of the tactite zones (fig. 103). Only the first 125 feet south of the north portal of the tunnel is in scheelite-bearing rocks. Several exploration crosscuts were driven from the remaining 325 feet of the tunnel. A 109-foot raise from the tunnel to the surface, a 70-foot winze sunk 80 feet from the north portal of the tunnel, and a 50-foot drift (South Drift) at the 70-foot level of the winze were driven in scheelite-bearing tactite. About 50 feet east of the West Tunnel, a 125-foot drift adit (East Adit) was driven south on another tactite zone. Tungsten-bearing rock was mined for about 100 feet, but mining was discontinued at the point where the tactite zone terminates against mica schist and quartz diorite.

In 1954, a tactite zone, exposed 800 feet southeast of the south portal of the West Tunnel, had been exposed in a 25-foot trench 3 feet wide and 4 feet deep. The zone is vertical, trends northward, and is 85 feet long by 8 feet wide.

Butte (Hillside) Mine. Location: S½SW¼ sec. 17, T. 25 S., R. 32 E., M.D.M., in the Greenhorn Summit tungsten area, Greenhorn Mountains, about 1 mile northwest of the Summit Lodge, on a southeast slope above Slickrock Creek. Ownership: Eva C. Hitchcock, Glennville, owns an undetermined number of unpatented claims (1957).

The Butte mine was first operated about 1952 and continued productive through 1956, but has been inactive since. More than 1,000 tons of ore, averaging between 0.65 and 1.0 percent WO_3, was mined. Ore was hauled by truck to a mill in Glennville.

The mine area is underlain by an irregular northwest-trending roof pendant that is 200 to 2,000 feet wide and is 4,000 feet long. It is in medium-grained hornblende quartz diorite. The Butte mine lies along the northeast side of the pendant which, here, strikes N. 20° W. In this area, the pendant is composed of coarsely crystalline white marble containing shaly partings; these strike N. 60° E. and dip 83° SE. Erratically distributed scheelite is present in bodies of tactite along the very irregular contact zone. The tactite is composed principally of epidote, garnet, clinozoisite, quartz, calcite, and diopside.

Development consists mainly of an irregular open cut about 50 feet wide, 50 feet high, and several hundred feet long. Two adits, now caved, were driven southwestward from the face of the open cut for an undetermined distance.

Several other properties are located along the contacts of this same roof pendant, and are geologically quite similar. These include the Wood No. 7, Lucky Strike, Good Enough, and Wood-Owl.

*Charles Reeves Tungsten Deposit.** Location: NW¼-SE¼ sec. 2, T. 25 S., R. 29 E., M.D.M., in the White River quadrangle at an elevation of 2,450 feet. Reached via the John Moore Ranch. Ownership: Charles Reeves Ranch, Woody (1956).

The Charles Reeves tungsten prospect is a recent discovery of an occurrence of scheelite in tactite along a contact zone between limestone and granodiorite. The prospect is developed by an open cut 25 feet long with an appended incline down 15 feet to the south at an angle of about 15 degrees. The incline was sunk along a limestone-garnet tactite contact. The tactite zone is about 10 feet wide and is in contact with hornblende-biotite granodiorite on the east. About 50 feet east of the incline three bulldozer cuts, 20 to 60 feet in length and 10 to 20 feet deep, expose a second tactite mass about 9 feet wide and 20 feet long. It lies between moderately decomposed granodiorite and a mass of granodiorite breccia similar to that seen at the Tugstore No. 2 mine. The prospect was idle in December 1956. No production.

*El Diablo (Pappy, Trojan, Jackpot, Tungsten Queen (?)) Mine.** Location: NW¼ sec. 31, T. 25 S., R. 33 E., M.D.M., 1½ miles west of Wofford Heights, 1 mile southeast of Cave Peak, near the road to Greenhorn Summit. Ownership: Mr. "Pappy" Hall, Isabella (1957).

El Diablo mine was first worked about 1940-42 by El Diablo Mining Co. (Jenkins, 1942, p. 362), and has operated only intermittently. Its most active period was 1952-56 when about 200 tons of ore, averaging more than 0.5 percent WO_3, was mined. The property has been idle since 1956.

The mine area is underlain by poorly exposed pre-Cretaceous metasedimentary rocks of a large roof pendant in granodiorite and gabbro; the gabbro is not exposed near the mine. Metamorphic rocks include quartz-biotite-epidote schist, quartzite, hornfels, and minor garnet tactite. Hornfels and quartzite are massive, in part granitized, and cut by quartz veinlets near the contacts with granodiorite. Scheelite is in fracture zones in metasedimentary rocks near contacts with igneous rocks. These zones are, in general, peripheral to a body of granodiorite that penetrates the roof pendant and crops out near the center of the mine area. This body is 17 feet wide at the surface, and on the adit level, 40 feet below, it is at least 80 feet in its largest dimension. The borders of this intrusive mass are highly schistose. Scheelite is also in fractures and brecciated zones within the pendant.

The property is developed by several small glory holes and open cuts that are as much as 75 feet long, 25 feet wide, and 20 feet deep. The glory holes bottom in raises from the haulage level, which was driven 212 feet N. 45° E. from a point near the paved road (fig. 104).

Gardner Deposit.† Location: NE cor. SW¼ sec. 24, T. 30 S., R. 40 E., M.D.M., Atolia district, 4½ miles

* By J. Grant Goodwin.
† Most of this information was supplied by D. L. Gardner, 1958.

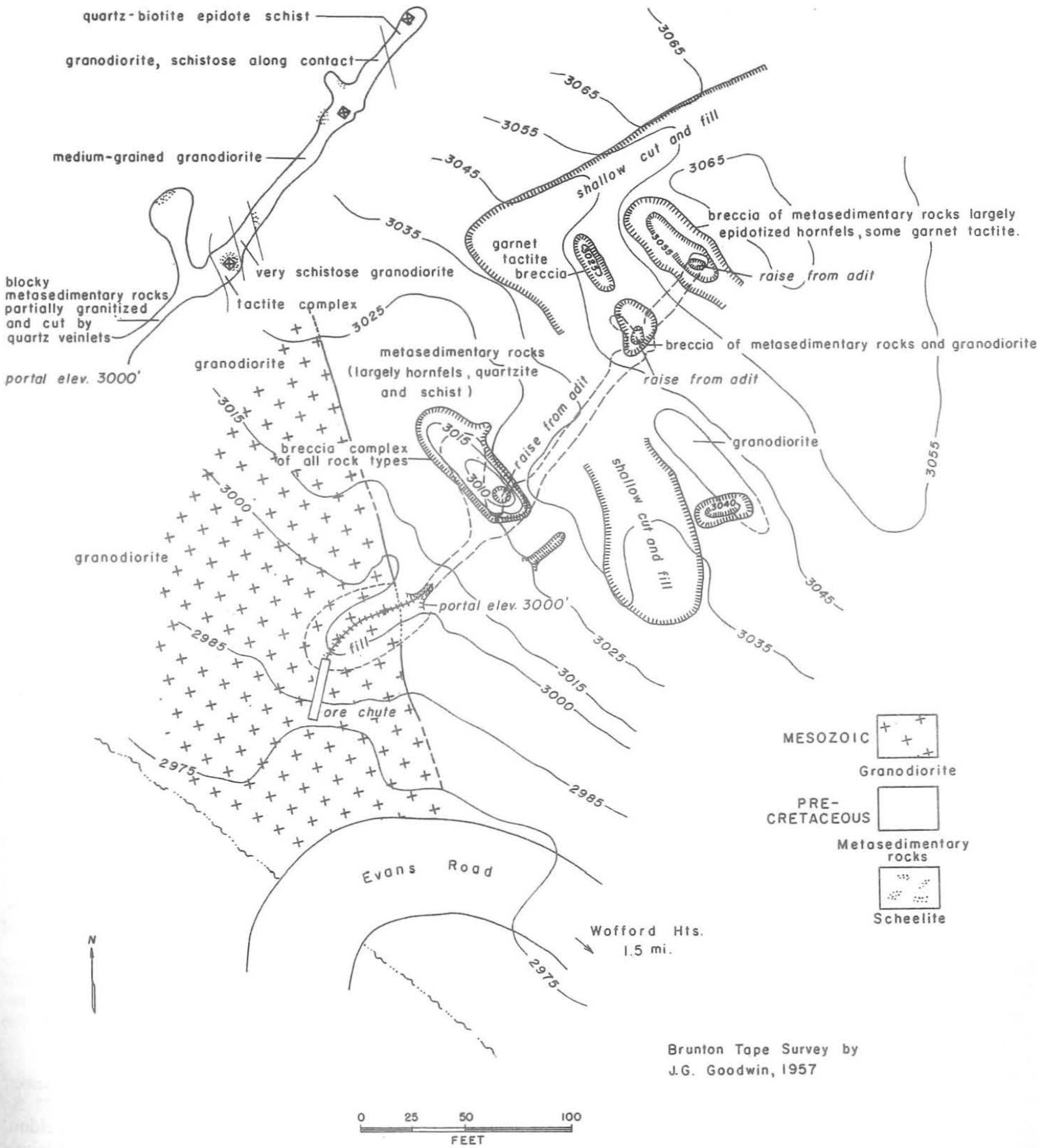


Figure 104. Geologic sketch of El Diablo mine and plan of the adit level.

south-southeast of Randsburg, along 2,200 feet west of the Union shaft in San Bernardino County, on the Smuggler (Smugular) claim. Ownership: The Gardner deposit is owned by Surcease Mining Co., P.O. Box 786, Sacramento (1958).

The Gardner deposit is the most recently discovered and most westerly of the known tungsten veins in the Atolia tungsten district. It was discovered late in 1956 and named the Gardner vein. Exploration was begun immediately, and by mid-1958 about 500 feet of drifts had been driven. Production was not disclosed, but a large part of the mining (discontinued in 1958) was in ore, which was recovered.

The vein is similar to many in the Atolia district. This district is almost wholly in San Bernardino County and has been an important source of tungsten. The Gardner vein is in a fault zone which trends about east-northeast and dips 60°-85° NW. The host rock is Atolia quartz monzonite. Scheelite, quartz, and calcite are the principal vein minerals. Mineralization consists of aggregates of honey-brown crystals and grains of scheelite in discontinuous lenses and veinlets within the vein. Parts of the fault zone contain very little or no calcite and quartz. The ore shoots in the vein are relatively small, high-grade, and pitch to the east. The scheelite lenses range in width from a fraction of an inch to 4 inches or more.

The Gardner vein is developed by a 125-foot shaft inclined about 80° N. 10° W. It connects three east-driven drifts at the 50-, 70-, and 125-foot levels. Some ore was mined in the shaft. The 50-foot level extends 115 feet east from the shaft. At a point about 45 feet from the shaft is the west end of a stope 30 feet long, which extends upwards to the bottom of an open pit. The open pit has been partly filled with waste since it was excavated. Ore in the bottom of the pit did not extend to the surface. The 70-foot level extends 190 feet east from the shaft and 30 feet southwest from the shaft. The 125-foot level is 170 feet long and extends east from the shaft. At about 140 feet from the shaft a raise was driven to the southeast to connect with the 70-foot level. Some ore was found in the raise and a short sublevel was extended along it. All three levels arc progressively south from their east-northeast trend at the shaft.

Good Enough (Gribble in part) *Mine.* Location: SW¼ sec. 17, T. 25 S., R. 32 E., M.D.M. Greenhorn Summit tungsten area, Greenhorn Mountains, 7½ miles east of Glennville on the northwest slope of a three-peaked mountain, 4,000 feet east of the point where the paved road crosses Cedar Creek. Ownership: Lee Hitchcock, Box 56, Glennville (1957).

The Good Enough deposit was recognized as early as 1942 when Fred L. Gribble owned it and other adjoining properties. No ore was produced under his ownership, however, and the property has been generally inactive. A total of less than 50 tons of ore that averaged about one percent WO_3 has been mined by the present owner.

The deposit consists of an irregular tactite zone along the contact between hornblende quartz diorite and the west side of a roof pendant composed of marble and hornfels. The roof pendant trends N. 35° W.; it is 4,000 feet long and at least 500 feet wide in the mine area. The contact zone is quite irregular and at some places contains migmatite or small irregular masses of hornblendic quartz diorite in the metasedimentary rocks. The tactite body ranges from a few inches to 25 feet wide, and is composed principally of very coarse-grained epidote, garnet, quartz, clinozoisite, calcite, actinolite, and diopside and contains irregularly disseminated grains of scheelite and a few scattered blebs of molybdenite. Bedding in the adjacent marble to the east strikes N. 10° W. and dips 85° E.

Development is limited to bulldozer stripping and shallow open cuts in which an area of several thousand square feet of surface has been exposed.

*Grandad (Miranda) Mine.** Location: NE¼ sec. 1, T. 26 S., R. 33 E., M.D.M., Kernville district, 6½ miles northeast of Isabella Dam, at the head of a southeast-draining tributary of Cyrus Canyon. Ownership: L. A. and J. B. Purinton, P.O. Box 72A, Kernville (1955).

The Grandad tungsten deposit was discovered in 1939 by Floyd Allen, Harold Chavez, and Don Hanning. Shortly afterward the property was leased to the Fairfield Mining Company and a small amount of ore was produced. It was milled at the Tungsten King mill formerly located near Havilah. Total production figures are not available, but in 1940 thirty-five tons of the ore yielded 350 pounds of concentrates containing 50 percent WO_3. The mine has been inactive since World War II except for a brief unproductive period in 1949.

The deposit consists of a body of scheelite-bearing tactite that lies along a contact between Mesozoic diorite and a roof pendant composed of limestone and quartzite. The tactite body strikes N. 5° W. and dips 50° NE., parallel to the layering in the metasedimentary rocks. It is 6 to 7 feet wide and is exposed laterally for a distance of 50 feet. It is composed principally of quartz, diopside, and garnet, and contains disseminated grains of scheelite. Mined ore averaged 0.2-0.3 percent WO_3.

The mine workings consist of a 30-foot shaft, now partly caved, and shallow prospect pits. A possible extension of the contact zone is exposed in one of the prospect pits 250 feet north of the shaft.

High Enough (Digger Pine) Prospect. Location: Approximate center of west edge of sec. 7, T. 27 S., R. 35 E., M.D.M., 5 miles south-southeast of Weldon, east side of Piute Mountains, 2 miles southeast of Nichols Peak. Ownership: Marion M. Nicoll, John W. Nicoll, Rubylee Hess and Carl G. Allen, Weldon (1957).

At the High Enough prospect scheelite is in a body of poorly layered tactite which is surrounded by rather

* By Thomas E. Gay, Jr.

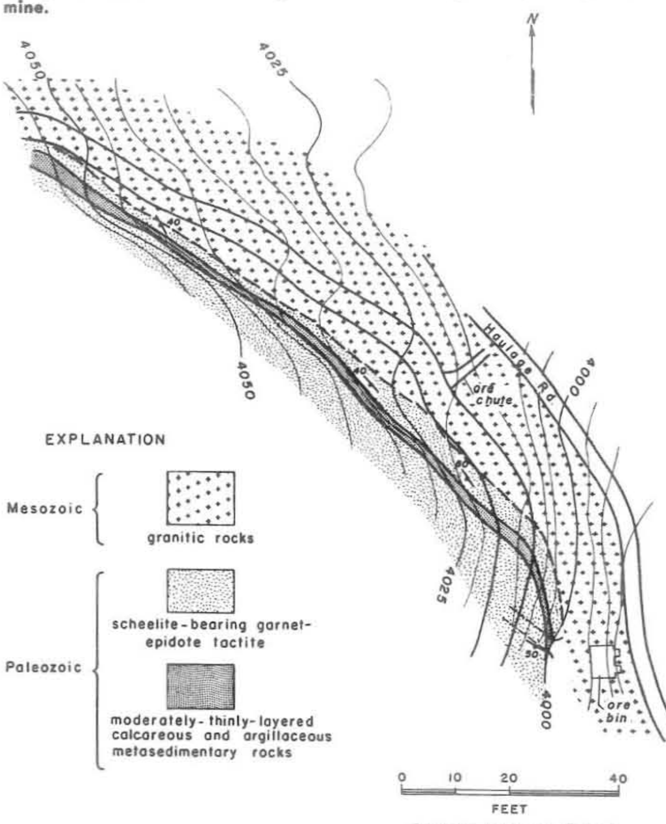
thinly layered siliceous and calcareous hornfelses and mica schist. The tactite body ranges from 2 to 5 feet in thickness and is exposed along the surface for approximately 150 feet. The layering in the tactite strikes N. 40° W., and dips 40°-60° SW., as does the tactite body. It is parallel in strike with a contact between quartz monzonite and metamorphic rocks and only a few feet from the contact. The tactite is composed mostly of dark green epidote and dark reddish-brown garnet and also contains a subordinate amount of quartz and calcite. Scheelite grains range from tiny particles less than 1/32 of an inch to grains as much as ¼ inch in diameter and are sparsely and irregularly disseminated throughout the tactite. The scheelite content of the body could not be estimated at the time the property was visited.

The mine workings (fig. 105) consist of a drift adit at the southeast end of the outcrop and several open cuts along strike to the northwest. The drift adit is about 100 feet long and trends N. 40° W.

*Hi-Peak Mine.** Location: Secs. 10, 15, T. 26 S., R. 38 E., M.D.M., 4½ miles northwest of Inyokern, half a mile west of U. S. Highway 6; mine adits are in center of section 10. Ownership: U. S. Flare Corp., 12270 Montague, Pacoima, owns 23 unpatented lode claims and a millsite. Principal officers of company are J. M. Hoyt, Jr., 465 Cabrillo St., Costa Mesa, and C. C. Parma, c/o R. M. Hyde, P.O. Box 935, Beverly Hills. The mine is leased to Hatton and Carlson Mining and Milling Co., 111 S. Broadway, Inyokern (1957).

* Compiled mostly from a description by R. H. Elliott, 1943.

Figure 105 (below). Geologic sketch of the High Enough (Digger Pine) mine.



Elevation assumed from Isabella quadrangle, U.S.C.E, 1943.
Mapping by Brunton compass and tape traverses (1957).

The Hi-Peak tungsten deposit was discovered early in 1942, and was soon leased and later purchased by U. S. Flare Corp. Mine development was begun in mid-1942 and, by December 1942, a total of 50 tons of tungsten ore had been shipped to the Pride of Mojave mill near Mojave. Small shipments of ore which contained an average of 2 percent WO_3 were made to a mill at Weldon before January, 1943 (Elliott, 1943). Ore also was mined and sold during 1945 and 1953-57. An undetermined tonnage of ore has been treated in a mill at a point on the Southern Pacific Railroad and about 3 miles northeast of the mine.

The scheelite-bearing tactite is in north-trending roof pendants of metamorphosed pre-Cretaceous sedimentary rocks in Mesozoic quartz monzonite. The largest pendant and the one that has been mined is 800 feet long, from 50 to 150 feet wide, and has 150 feet of relief in exposure. The bottom of the pendant has not been penetrated. Smaller north-trending pendants crop out south and west of the main pendant. The metamorphosed rocks are thinly layered limestone, calc-silicate hornfels, schist, quartzite, and tactite. The layers strike nearly due north and dip 70° W. to 70° E.

The tactite is in lenses and discontinuous layers bordered by other metamorphic rocks, as tabular masses along shear zones, as layers on the borders of the roof pendant, and as lenses between limestone and pegmatite. The tactite is composed mostly of brown garnet and green epidote and contains other calc-silicate minerals and quartz. Scheelite is in both high-grade streaks and disseminated fine to coarse grains in the tactite; it is mostly in tactite near limestone. Most of the mined ore bodies were from 1 to 4 feet wide, several feet from top to bottom and a few tens of feet long. One ore body was 20 feet wide. Some of the thin layers of tactite contain bulges or pods of high-grade ore. Locally the tactite contains small grains of pyrite, chalcopyrite, and arsenopyrite. The average grade of the ore was not learned, but Elliott (1943) stated that ore containing 2 percent WO_3 could be easily sorted from the mined material and Hatton and Carlson state that the ore mined in 1956-57 contained from half of one percent to 2 percent WO_3 (personal communication, 1957).

The mine contains about 3,500 feet of lateral workings on three levels. Originally, drifts were extended north and south from a 200-foot crosscut adit driven S. 60° W. from a point on the east side of the main pendant and about 150 feet from the north end of the pendant. This level plus two lower levels are now connected with a

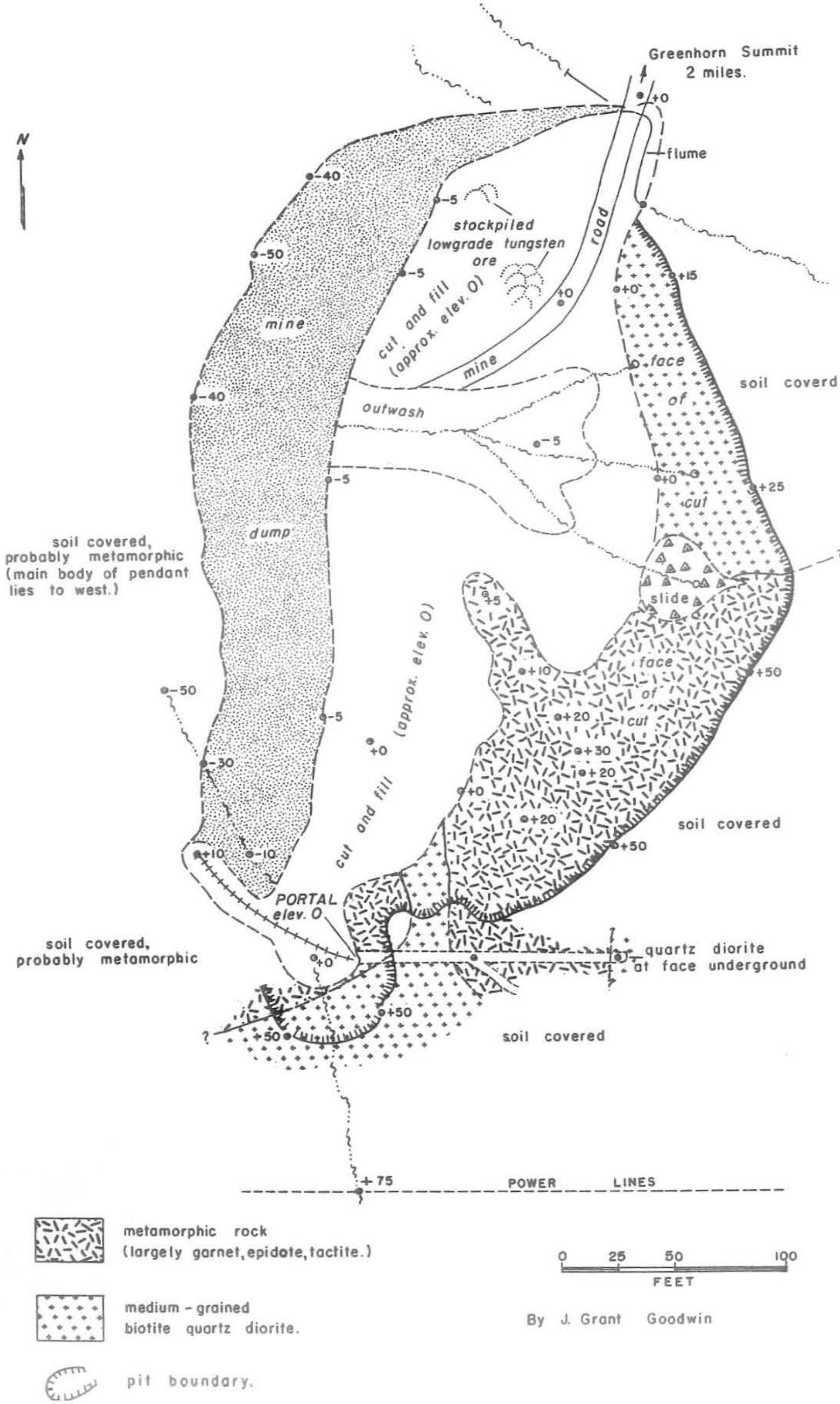


Figure 106. Geologic sketch of the High Power deposit.

shaft inclined 45° to the south at the north end of the pendant. A 400-foot drift adit extends south from the south end of the large pendant to intersect a smaller pendant.

*High Power (Power Line) Deposit.** Location: S½ NW¼ sec. 20, T. 25 S., R. 32 E., M.D.M., Greenhorn Summit tungsten district, half a mile west of Greenhorn Summit, a quarter of a mile south of paved road to Glennville. Ownership: A.R.O. & M. Corp., Mr. Brandini, president, Bakersfield (1957).

The High Power tungsten deposit was being explored as early as 1942 (Jenkins, 1942, p. 325), but has no recorded production. Ore is reported to have been milled at the Hitchcock mill in Glennville.

The scheelite is in tactite near the eastern margin of a roof pendant of pre-Cretaceous metasedimentary rocks in medium-grained biotite quartz diorite. The pendant is about half a mile wide at this point and extends 1 mile northwestward and 3 miles southeastward. It is composed largely of slate, hornfels, and quartzite. The tactite crops out in poorly exposed irregular masses or zones as much as 200 feet wide. Typically the rock is composed of garnet, epidote, quartz, and calcite, and contains sparsely disseminated grains of scheelite.

The workings (fig. 106) consist mainly of an open cut 400 feet long and 200 feet wide (maximum), with a cut bank that is a maximum of 50 feet high. The long axis of the pit trends N. 15° E. At the south end of the pit an adit was driven 119 feet eastward. One hundred feet from the portal an appended working was driven an undetermined distance southeastward. In 1957, about 60 tons of low-grade ore was stockpiled at the north end of the cut.

Last Chance Mine. Location: Center S½ sec. 34, T. 26 S., R. 34 E., M.D.M., 3¼ miles south of Weldon, 1¼ miles west of Nichols Peak, Piute Mountains. Ownership: Rene Engel and Louis Zelle own four claims (fig. 102); leased to Rene Engel and Associates, P.O. Box 96, Wofford Heights (1957).

The Last Chance mine yielded a few tons of tungsten ore in 1954 and a small tonnage probably was mined previously.

The rocks in the vicinity of the mine are poorly exposed but the principal mine workings are aligned N. 65° W. for about 300 feet, apparently along one or more bodies of metamorphic rocks in quartz monzonite. The only exposures of tactite are in a trench 10 feet long and a 25-foot vertical shaft. It is the principal rock, however, in dumps of two other shafts. The tactite is composed principally of coarsely crystalline dark-green epidote and dark reddish-brown garnet. Scheelite grains are sparsely disseminated through some of the tactite found in the mine dumps. Chalcopyrite and green copper oxides are minor constituents of part of the tactite in the dumps.

From east to west the mine workings are as follows: A shaft, about 100 feet deep, inclined 65° SW.; a trench 10 feet long 100 feet N. 65° W. from the shaft; a shaft, about 75 feet deep inclined 80° SW. 150 feet N. 65° W. from the trench; and a 25-foot vertical shaft 50 feet farther west. Both of the inclined shafts are very old and may have been developed for gold or copper. In 1954, tactite in the dumps from the eastern shafts was milled and a few units of tungsten concentrates was recovered. The vertical shaft is the most recently excavated and probably the source of some ore.

Little Dick (Good Hope) Mine. Location: SE¼ sec. 23, T. 25 S., R. 33 E., M.D.M., Kernville district 1 mile southeast of Kernville, at the top of a small hill between forks of Caldwell Creek. Ownership: Cecil W. Pascoe, P.O. Box 42, Kernville (1955).

The Little Dick deposit was probably discovered in the late 1930s, but little ore was produced until 1940 and 1941 when C. J. Gusty, a lessee, worked the mine and set up a 10-ton mill. In 1943, George Munsen and H. M. W. Daley took over the lease but little mining was done. The mine has been idle since 1943. Total production figures are not available, but the total tonnage milled is probably less than 500 tons.

The deposit consists of scattered lenses of tactite in a roof pendant of pre-Cretaceous metasedimentary rocks which cap the hill. Igneous rocks, principally of gabbroic composition (Miller and Webb, 1940, p. 378), underlie the pendant at shallow depths. The metamorphic rocks, mostly limestone and quartzite, strike generally north and dip steeply east. The igneous rocks exhibit lineation and sheeting which strike N. 10° E. and dip 80°-85° SE. The lenses of tactite strike and dip parallel to the lineation. The tactite is composed principally of garnet, epidote, hornblende, quartz, calcite, and small, round grains of scheelite.

The main workings are centered around a 125-foot adit driven S. 10° E. Ore was mined from a 25-foot drift 90 feet from the portal, a shorter heading 100 feet from the portal, and a glory hole measuring 40 feet by 15 feet by 12 feet deep about 20 feet from the portal. A shallow caved pit 75 feet east of the main portal also yielded ore. One hundred twenty feet west and 40 feet higher than this portal another adit was driven 60 feet N. 30° W. thence 75 feet N. 70° W. into the gabbro; no ore was encountered.

Lucky Hit (Buckhorn, Why Not) Mine. Location: N½ sec. 19, T. 25 S., R. 32 E., M.D.M., Greenhorn Summit tungsten district, 1⅓ miles west northwest of Greenhorn Summit, 2½ miles south of Big Sunday Peak, north of Cedar Creek. Ownership: Don E. Lewis, Summit Lodge, via Glennville, and Walter Hitchcock, Glennville (1957).

The Lucky Hit deposit was discovered in 1916 by J. R. Rogers. Only small tonnages of ore were mined in the subsequent years, and the mine was inactive from about 1920 until 1954. Intermittent mining was done from 1954 to 1956, but records indicate less than 100 tons of ore was

* By J. Grant Goodwin.

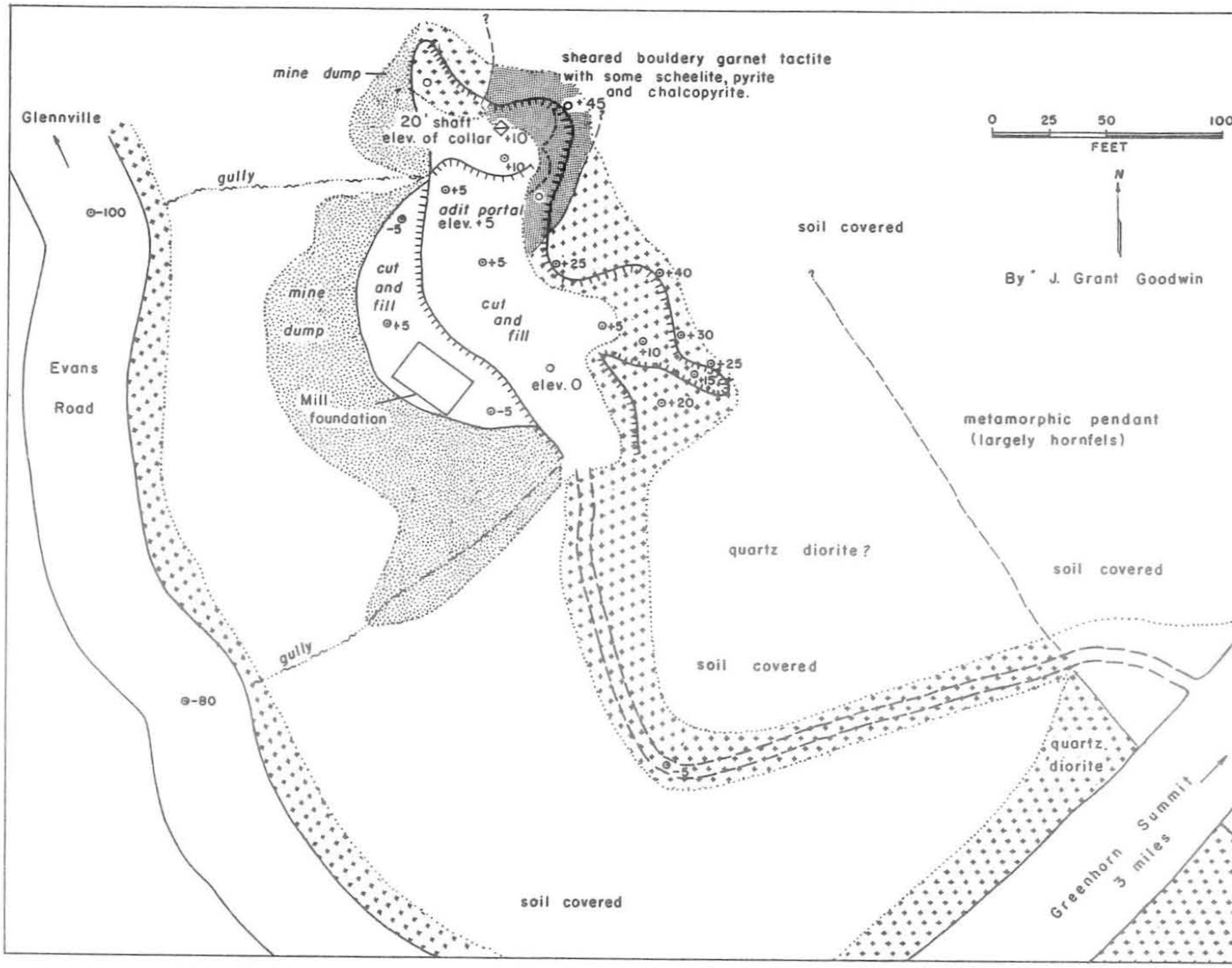


Figure 107. Geologic sketch of the Lucky Hit mine.

mined in this period. A mill was once on the property but has been removed.

The mine area is underlain by quartz diorite and the western margin of a roof pendant of pre-Cretaceous metasedimentary rocks composed mostly of slate, hornfels, and quartzite. The pendant extends northward about half a mile and southward about 3 miles from the mine area. It is approximately half a mile wide in the vicinity of the mine. Sparsely disseminated scheelite grains are associated with pyrite and minor chalcopyrite in variously oriented fractures in a shear zone within a tactite body. The zone strikes N. 10°-20° W. parallel to and a few tens of feet west of the margin of the pendant. Coarse-grained garnet and epidote comprise most of the tactite. Surface exposures of tactite exhibit brown to yellow iron oxide staining and, locally, blue sulfates of copper and iron.

The property is developed by an open cut 200 feet long, about 50 feet wide, with faces 15 to 45 feet high (fig. 107). At the north end of this cut a 20-foot single compartment vertical shaft was sunk and a 42-foot adit driven northward from a point 40 feet southeast from the collar of the shaft. Two prominent fractures are exposed in the adit. One strikes N. 45° W. and is vertical; the other strikes N. 15° W. and dips 30° NE.

Major (Sweet Marie, June Ione, Rand Group) Mine. Location: Slightly east of the center of sec. 19, T. 19 S., R. 32 E., M.D.M., in the Greenhorn Mountains, a quarter of a mile S. 45° E. of Cedar Creek Campgrounds on Slickrock Creek. Owner: Brooke Woods, Glennville (1957).

The Major mine was first worked in the period 1916-17 by the Rand Mining Company under whose management

most of the development was done. Since then it has been worked only periodically. Complete production figures are not available, but since 1953 the mine has yielded a few hundred tons of ore that averaged between 0.5 and 1.0 percent WO_3.

This deposit consists of bodies of scheelite-bearing tactite along the western margin of a northwest-trending pendant in quartz diorite. The roof pendant averages about 2,000 feet in width and extends 3 miles to the southeast and 1 mile to the northwest of the Major mine. It is composed of slate, hornfels, quartzite, and limestone. Tactite bodies which average from 5 to 15 feet in width where exposed apparently are discontinuous along the contact. These form lenticular bodies that alternate and are intimately mixed with migmatite. Coarse-grained epidote, quartz, garnet, and calcite are the principal minerals of the tactite. Wollastonite was noted by Hess (1922, p. 265) in the transition zone between the tactite and recrystallized limestone to the east.

Scheelite, erratically distributed in tactite, is associated with pyrrhotite, pyrite, and small proportions of chalcopyrite, and molybdenite (Kerr, 1946, p. 155). Pockets of ore containing as much as 30 percent WO_3 were encountered near the surface but the grade of the ore is less than 1 percent at 50 feet below the collar of the shaft (Hess, 1922, p. 263).

Development consists of a single-compartment shaft which is from 50 to 75 feet deep, and a few short drifts and open cuts. A small mill and concentrating table remain on the property, although no mining is being done at present.

Minnehaha (Claude, Mayflower) Mine. Location NE¼ sec. 1, T. 31 S., R. 33 E., M.D.M., Loraine district, 4 miles southeast of Loraine, about 1 mile northeast of Nellie's Nipple, a prominent small peak south of Indian Creek. Ownership: George Ramey, Caliente, owns two unpatented claims and a millsite (1958).

The Minnehaha mine is one of the oldest mines in the Loraine district. Scheelite was recognized at the mine about 1907, and during World War I it was recovered by reworking part of the mine dumps. Exploration for tungsten was limited to the sinking of a winze from the upper level concurrent with the dump-reworking activities. A very limited amount of development work has been done since 1918 with little output.

A roof pendant of pre-Cretaceous metasedimentary rocks underlies the mine area and is in contact with quartz diorite approximately 1,000 feet northwest of the mine. Free gold, scheelite, and minor amounts of pyrite are in a quartz vein that strikes N. 35° E. and dips 55° NW. It is parallel to bedding planes of the schist hanging wall. Coarsely crystalline white limestone forms the footwall. The quartz vein pinches and widens from a stringer a fraction of an inch wide to lenticular bodies 4 feet wide and a few tens of feet in length and height. Scheelite crystals in the vein range in size from tiny blebs to well-developed crystals weighing as much as 100 pounds (George Ramey, personal communication, 1958).

The principal development of the Minnehaha mine consists of two drift adits. The upper adit was driven 280 feet S. 35° W. with short exploratory crosscuts into both walls at various intervals. Several ore bodies, some of which extend a few tens of feet to the surface, were mined from this level. A 50-foot winze several tens of feet from the portal provides access to a short sub-level drift from which a small high-grade body of scheelite was removed during the 1950s. The lower adit, 60 feet below and 75 feet northeast of the upper adit, was driven about 300 feet southwest parallel to the vein structure but several feet in the footwall. In 1907, an 800-foot crosscut 1,000 feet northeast of the lower adit was driven toward the vein, but was abandoned before the vein was encountered.

Owl (Wood-Owl) Mine. Location: Center of the E½ sec. 17, T. 25 S., R. 32 E., M.D.M., in the Greenhorn Summit tungsten area, Greenhorn Mountains, 1¼ miles northeast of Greenhorn Summit, on the northeast branch of the head of Cedar Creek. Ownership: Brooke Woods, Glennville, owns several patented claims (1957).

The Owl mine probably was discovered in the late 1930s. It has a production of 6,000 to 7,000 tons of ore containing an estimated 0.5 to 1.0 percent of WO_3. Most of this was mined in 1941, although production extended from 1940 through 1944. The mine has been idle since 1944.

The deposit consists of lenticular bodies of scheelite-bearing tactite from 5 to 15 feet wide and irregularly disposed along a contact between quartz diorite and coarsely crystalline limestone. The ore bodies lie at the northwestern tip of a northwest-trending pendant which is about 4,000 feet long. In the mine area the pendant is 200 feet wide, but it widens abruptly to the southeast where it has a maximum width of 2,000 feet. The tactite bodies form a discontinuous north-trending zone cut by a number of northwest-striking fractures which seem to have controlled the mineralization (Tucker and Sampson, 1941, p. 577).

One ore shoot, in the middle adit, extends 30 feet along strike, is 15 feet wide, and 20 feet in vertical extent. Two parallel ore streaks, which were removed by surface cuts, were 4 feet wide and were separated by 8 feet of marble.

Development consists of three 100-foot adits driven south at 40-foot vertical intervals. An ore body adjacent to the stream was removed by a surface cut.

Pala Ranch (Old Andrew, Reagan) Mine. Location: NW¼ SW¼ sec. 25, T. 25 S., R. 32 E., M.D.M., 2½ miles west of Wofford Heights, half a mile southwest of Cave Peak. Ownership: Pala Ranches, Earl Pascoe, Kernville (1958); leased to Rene Engel and Associates, Wofford Heights.

The Pala Ranch mine was known as early as 1943, but details of its early development are lacking. Most of the exploration at the mine was performed in the early 1950s. During this interval of activity 150 tons of ore, averaging 0.3 percent WO_3, was shipped from the mine

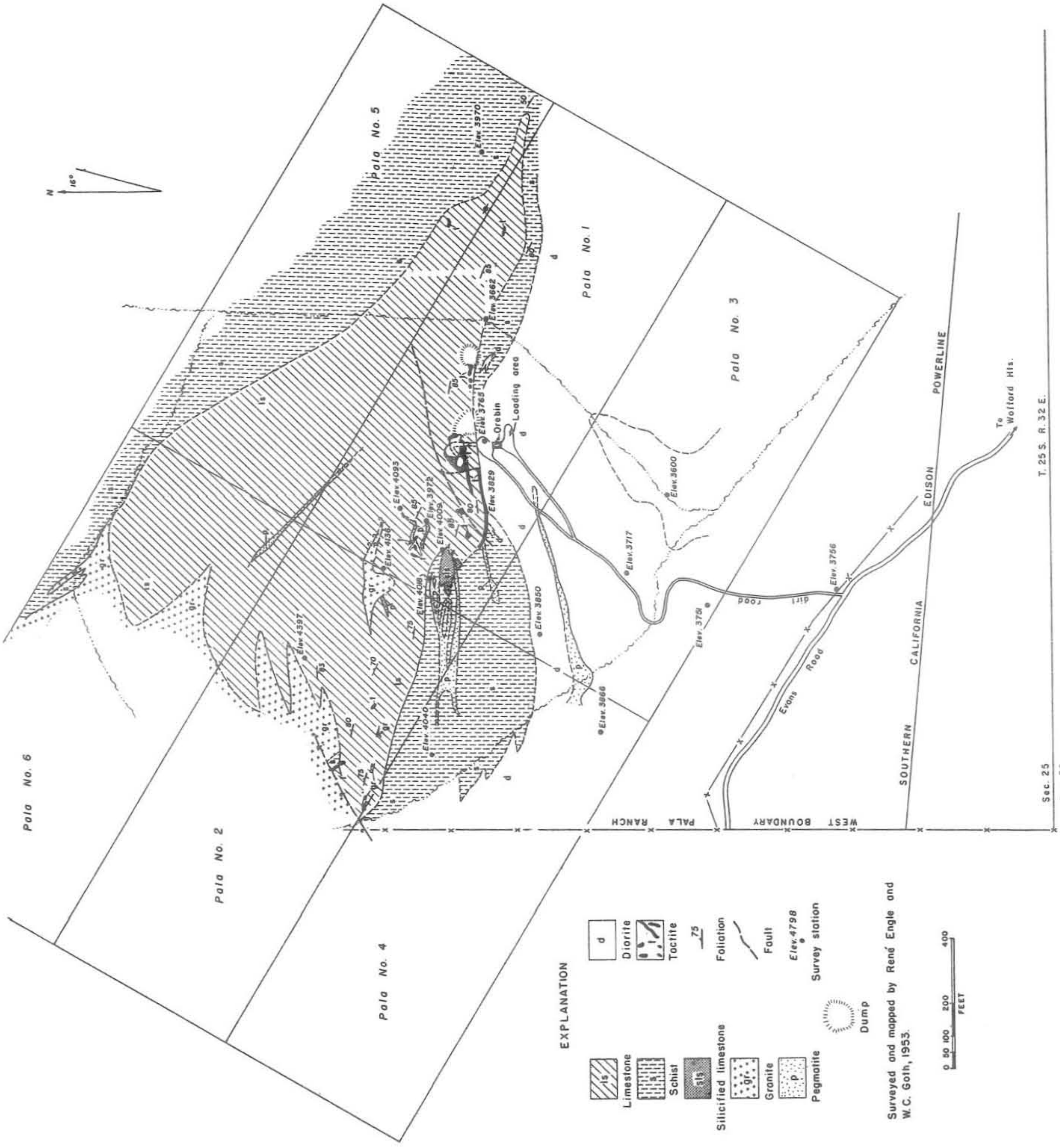


Figure 108. Geologic map of the Pala Ranch mine.

and processed in a mill at Weldon (Rene Engel, 1958, personal communication).

The Pala Ranch mine is on the south edge of a limestone body about 2,000 feet long and over 500 feet wide (fig. 108). The limestone body trends N. 65° W. and is part of a large roof pendant in gabbroic and granodioritic rocks. The limestone-diorite contact is partly concealed by a capping of cemented limestone rubble 5 feet thick which overlies the diorite. The limestone, which is brecciated to various degrees, is cut by quartz veinlets 1 to 5 inches wide generally near intrusive contacts, and sheared pegmatite dikes as much as 5 feet wide. Scheelite is in garnet-epidote tactite bodies in the limestone parallel to and within a few to several feet of the intrusive contacts. Garnet concentrations are largely confined to the borders of the pegmatite dikes and severely brecciated limestone, and to lesser extent to the veined limestone.

The property is developed by an irregular open cut, approximately 50 feet by 20 feet and 15 feet deep, to which two shorts adits are appended (fig. 108). From a point 50 feet south of and downslope from the open cut a crosscut adit was driven 70 feet N. 3° W. then 50 feet S. 60° W. along scheelite-bearing ore.

*Rimrock Mine.** Location: NE¼ SE¼ sec. 2, T. 25 S., R. 29 E., M.D.M., White River district, 3 miles southeast of White River, 2 miles south of Bald Mountains. Ownership: John Moore Ranch, Woody (1956).

The Rimrock mine was discovered in 1952 by John Moore and operated intermittently through 1956. During the first 2 years of operation ore was hauled to Tulare County Tungsten Company's mill in Yokohl Valley about 30 miles north of the mine. In 1954, a small mill was constructed at the mine; the mill consisted of a small jaw crusher, ball mill, and dry concentrating table. Reported production is less than 100 tons which averaged between 0.5 and 1.0 percent WO_3.

Tungsten mineralization at the Rimrock mine is in tactite along both edges of a small horse of coarsely crystalline, white limestone between two vertical shear zones in deeply weathered granodiorite. The limestone body is 30 feet wide by 70 feet long and trends N. 30° E. parallel to the shear zones. Tactite has formed along those shear zones and it is composed of brown garnet and lesser amounts of diopside, calcite, limonite, and manganese dioxide stains. Scheelite grains are disseminated in the tactite.

A few hundred feet west-southwest of the mine workings, a northwest-trending roof pendant of limestone, quartzite, and schist crops out over an area 800 feet wide and 1,200 feet long. The vertical shear zones if projected toward this pendant would intersect it at a distance of 300 feet from the mine.

The mine has been developed by two open cuts and a 50-foot vertical shaft. Levels at 25, 35, and 50 feet extend to the north and northeast from the shaft. The open cuts are 70 feet long by 20 feet wide by 15 feet deep, and 30 feet long by 15 feet wide by 20 feet deep. Underground workings were inaccessible in late 1956.

* By J. Grant Goodwin.

Stardust (Dorris and Cuddeback Property, Star Dust and Black Cat) Mine. Location: Center of west boundary sec. 2, T. 27 S., R. 34 E., M.D.M., 4 miles south of Weldon, 1 mile south-southeast of Nichols Peak, Piute Mountains. Ownership: Not determined in August 1957.

The Stardust mine was productive only in 1943 when about 1,000 tons of ore of undisclosed grade was shipped to the C. and H. mill at Weldon (Tucker and Sampson, 1943, p. 62).

The Stardust mine area is underlain by two pendants of metasedimentary rocks in quartz monzonite. From the mine site in a steep-walled canyon one pendant extends a few hundred feet southeast and the other a few hundred feet northwest from the canyon. The northeast border of each pendant contains a zone of discontinuous bodies of medium- to coarse-grained garnet-epidote tactite. The zone in the southeast pendant strikes N. 40° W.; the other strikes N. 60° W.; both dip steeply southwest in most places. The tactite bodies exposed in outcrop are 4 feet or more wide, and individual bodies are probably a maximum of several tens of feet in lateral and vertical dimensions. Tactite in a small stockpile at the mine contained scheelite grains disseminated in thin layers parallel to the long axes of the pendants. The scheelite grains are as much as an eighth of an inch in diameter. Some layers contain several percent of WO_3 but most of them probably contain less than 1.0 percent of WO_3. The spacing of scheelite-bearing layers was not observed in outcrop.

The southeast tactite zone is developed by a southeast-trending drift adit in the northwest part of the pendant at the level of the canyon bottom. Across the canyon a few tens of feet to the west is a shaft, now filled with water, which was sunk in the canyon bottom at the northwest tip of the southeast pendant. About 90 feet northwest of the shaft collar is the portal to a drift adit driven a few tens of feet N. 60° W. into the northwest pendant. It is along a tactite zone 1 to 3 feet wide which is also exposed in an open cut 80 feet northwest of the portal. A short raise was driven to the surface in ore a few feet from the portal of the adit. Tucker and Sampson (1943, p. 62) report a stope 65 feet long, 5 to 6 feet wide, and 30 to 45 feet high in tactite at the bottom of a 60-foot shaft which is probably the water-filled shaft in the canyon.

Stardust Prospect. Location: NW cor. sec. 20, T. 27 S., R. 35 E., M.D.M. (proj.), 7 miles south-southeast of Weldon, half a mile southeast of the crest of Rocky Point, about half a mile east of a paved county road. Ownership: John W. Nicoll and Martin L. Hess, Weldon, own one claim (1957).

At the Stardust prospect, scheelite is in very dark green tactite in a roof pendant approximately 200 feet long and 100 feet wide. The pendant is composed of dark mica schist, layered hornfels, and tactite. It is bordered by a "shell" of hornblende gabbro which is enclosed in quartz monzonite. Tactite is in irregular to

lenticular bodies from a few inches to several feet in maximum dimension. The tactite consists mostly of coarsely crystalline epidote, calcite, and garnet. The scheelite is in closely spaced tiny grains, and in more widely spaced larger grains as much as three-eighths of an inch in maximum dimension. The scheelite is erratically distributed and to date has been found only in two small lenses. The average grade of the scheelite-bearing rock is probably less than 1 percent of contained WO_3.

The pendant is developed by an adit driven S. 30° E. approximately 100 feet and two open cuts each about 15 feet long. The adit probably was driven in search of copper or gold before the discovery of scheelite. The open cuts are southeast of the portal of the adit; one is about 10 feet deep, the other is 15 feet deep, and they are at the sites of the small lenses of scheelite-bearing tactite.

No ore had been produced from the deposit by 1958. Mineral collectors have obtained well-developed and rather large crystals of calcite and epidote from the tactite.

*Stringer District Placer Mines.** Location: Secs. 12, 13, 14, 23, 24, 25, and 26 T. 30 S., R. 40 E., M.D.M., Stringer and Atolia tungsten districts, about 3 miles southeast of Randsburg, along paved county road. Most of the mining has been done in the south half of section 12. Ownership: Placer and lode claims were held by several persons and mining concerns (1958). Part of the area was in litigation. Super Mold Corp. of California, Lodi, holds placer claims totaling 490 acres in the S½ sec. 12, E½ sec. 13, and NW¼ sec. 13. C. W. Dunton, 1145 Westminster St., Alhambra, and S. E. Chiapella, 1625 N. Las Palmas Ave., Hollywood 28, hold placer claims totaling 2,560 acres in all of secs. 13 and 24, SE¼ sec. 14, W½ sec. 23, N¾ sec. 25, and NE¼ sec. 26. Other concerns and individuals hold lode and placer claims in the sections listed above and in adjacent sections.

The Stringer district placer deposits are about 1½ miles north-northwest of the scheelite-bearing lode deposits at the western end of the Atolia district. They overlie some of the scheelite-bearing "stringers" of the Stringer district. The Stringer deposits have been mined intermittently for placer scheelite and gold since 1905. The total output of tungsten concentrates, although not determined, is probably several thousand units of contained WO_3. At least part of the tungsten and gold output of the Stringer mines has been recorded with that of the Atolia district.

As the area is arid, nearly all of the gold and tungsten from the placer material has been recovered by dry concentration and screening followed by wet separation of the concentrates. Until the end of World War I scheelite, in the form of potato-shaped fragments or "spuds," was collected from the surface by hand. Since that time larger-scale mining has been done intermittently by removing nearly barren overburden and concentrating the underlying placer material by drying it, crushing oversize fragments, and passing it through trommel screens. Concentrates from the dry-separation plants have usually been treated further by wet separation methods and magnetic separation, sometimes in mills outside the area, to obtain nearly pure scheelite and gold. The ore and the overburden have been removed mostly with drag-line equipment or power shovels, although other types of equipment have been used with varying degrees of success.

The scheelite in the placer material is mostly in the form of sub-rounded to angular grains a quarter of an inch or less in diameter, but some fragments weigh as much as several pounds. Most of the scheelite is in irregular and poorly defined channels a few tens of feet in maximum width, a few feet in depth, and several tens to a few hundred feet long. One channel was approximately half a mile long and 60 feet wide. The general course of the channels is from northwest to southeast, nearly coincident with the drainage channels on the surface. Several scheelite stringers in underlying rocks have been discovered by noting abrupt increases in size, angularity, or quantity of scheelite grains in the alluvium. Most of the stringers are only a few tens of feet in maximum length and depth and 1 or 2 inches wide, although some of them are as much as 8 inches wide.

In 1943, a total of 291 test pits 30 inches square and from one to 45 feet deep, were sunk by Placer Concentrators, which at that time was a part of Super Mold Corporation. The procedure was intended to determine the gold and WO_3 content of the scheelite-bearing alluvium in 770 acres in parts of secs. 11, 12, 13, and 14, T. 30 S., R. 40 E., and sec. 18, T. 30 S., R. 41 E., M.D.M. The "values" in each pit were based on the price in 1943 of $30 per unit of WO_3. The area was determined to be underlain by 1,578,000 cubic yards which contained 33 cents per cubic yard in WO_3 and an additional 5,462,000 cubic yards which contained between 25 cents and 33 cents per cubic yard. The value per cubic yard ranged from a few cents to $6.36.

Probably the most productive period of operation by a single company was 1953-56 when the Lila King Mining Co. was mining scheelite both from placer and lode deposits. Several individuals were also mining in the area at that time. Placer Concentrators Co. recovered scheelite from placer deposits in 1943. The placer material also has been extensively tested by other companies.

*Susie Q (Black Sambo) Prospect.** Location: SE¼ sec. 9, T. 25 S., R. 32 E., M.D.M., Greenhorn Summit tungsten area, about 2 miles northeast of Greenhorn Summit, on Calf Creek midway between Black Mountain and Big Sunday Peak. Ownership: Mr. Al Wilburn, 406 3rd St., Taft, and Mr. Fred Roope, 1100 Tangerine St., Bakersfield (1957).

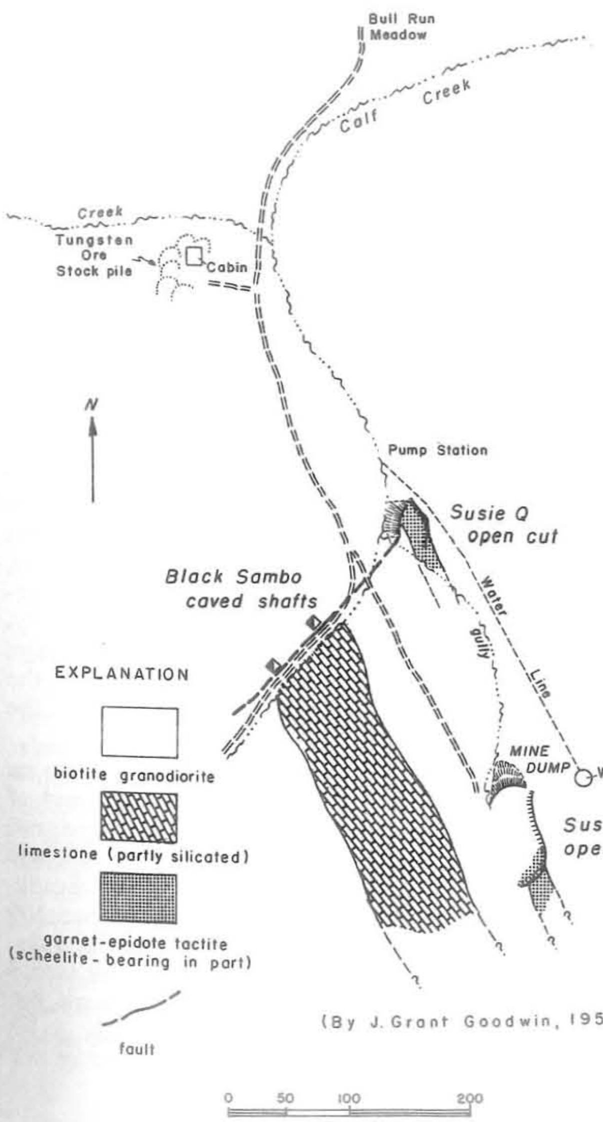
* Information obtained in part from an unpublished U.S. Geological Survey memorandum on the Placer Concentrators property, 1943 by Charles W. Chesterman.

* By J. Grant Goodwin.

The Susie Q tungsten deposit originally was located as an antimony prospect, but in 1954 was located for tungsten. Neither tungsten nor antimony has been produced from this property.

The area is underlain by pre-Cretaceous metasedimentary rocks which form a roof pendant with a maximum width of about 1,000 feet; it extends half a mile S. 30° E. from its northwest termination at Calf Creek (fig. 12). Enclosing the pendant is medium-grained quartz diorite of Mesozoic age. Along the eastern contact of the pendant, white, coarsely crystalline limestone crops out in a belt, 100 feet wide, and extending an undetermined distance to the southwest (fig. 109). Disseminated grains of scheelite are in a discontinuous vertical zone of garnet-epidote tactite, which is 20 feet wide and strikes N. 20° W. It is apparently in quartz diorite within the roof pendant but is parallel to and within a few tens of feet of the northeast side of the limestone. Exposures in the vicinity of the mine are poor.

Figure 109 (below). Geologic sketch of the Susie Q prospect.



On the northwest side of Calf Creek the limestone is cut off by a nearly vertical fault which strikes N. 35° E. Here stibnite is along a breccia zone in limestone. The breccia zone apparently trends parallel to the fault and contains stringers of quartz. Stibnite is sparsely disseminated in the breccia and the quartz. The limestone in the fault zone has altered to tremolite and diopside.

Each of two tactite outcrops, 300 feet apart, have been explored by an open cut. The upper one, 250 feet south of Calf Creek, is a bench 75-feet long with a 40-foot face. The lower cut, adjacent to Calf Creek, is about 50 feet long with an irregular face 10 to 15 feet high. Two shallow single-compartment shafts, now caved, were sunk about 20 to 30 feet into the stibnite-bearing zone.

*Tungsten Chief (Wall Street, Ophir-Zuck) Group.** (Includes *First Landing, Good Hope, Rocky Point Mines*). Location: Mostly in SW¼ sec. 27, T. 28 S., R. 32 E., M.D.M., Red Mountain area, about 5½ miles south of Havilah. Ownership: Mike J. Gusty, Isabella, owns three claims (1958).

The Tungsten Chief deposit was discovered about 1918 by A. D. Zuck, and a small amount of ore was mined and shipped the same year. Between 1918 and 1939, the mine was idle, but in 1939 a small shipment was made (Partridge 1941, p. 304). The mine was most productive during the period 1940 to 1950 when it yielded about 4,000 tons of ore that averaged between 0.7 and 1 percent WO_3. The mine's total yield is probably about 4,300 tons.

The mine area is underlain by the northwest part of an irregular roof pendant of pre-Cretaceous metasedimentary rocks. The pendant trends about N. 30° W., extends southeastward about 2 miles, and averages about 1 mile in width. In the mine area the pendant is composed of mica schist and limestone. Narrow embayments 100 to 300 feet wide of Mesozoic biotite quartz diorite extend into the north end of the pendant as far as 1,000 feet from the main mass of igneous rocks (fig. 6). Northwest-trending tabular masses of quartz diorite also are wholly enclosed in the roof pendant. These masses are similar in composition, size, and trend to the quartz diorite in embayments, but are disconnected on the surface from the main mass of igneous rock. Tungsten minerals are in bodies of tactite which lie along and near intrusive contacts. In general, the tactite zones that were mined were from 4 to 10 feet wide and were several tens of feet long. They strike mostly between N. 45° E. to N. 45° W. and dip steeply in either direction. Most of the ore consists of sparsely disseminated grains of scheelite in tactite composed principally of quartz, garnet, and epidote; but one ore shoot lies in a quartz body.

At the First Landing mine, the lowest and westernmost deposit of the group, small but high-grade scheelite-bearing tactite lenses are along the contact between silicated limestone and mica schist. Most of the scheelite was sparsely disseminated as crystals half an inch to 4 inches in diameter (Tucker, 1921, p. 316). Ore was mined from zones of tactite, approximately 500 feet apart, that strike N. 40°-50° E. and dip 50°-60° NW. The largest ore body

* By Rudolph W. Fekete.

encountered was 85 feet long, 6 to 8 feet wide, and averaged 1.75 percent WO_3 (Tucker and Sampson, 1941, p. 578).

The First Landing deposit is developed by two 50-foot vertical shafts 500 feet apart, and several hundred of feet of horizontal workings driven from adits.

At the Good Hope mine, 1,000 feet east of the First Landing mine, several bodies of scheelite-bearing tactite strike N. 10° E. and dip 60° SE. The zones average about 4 to 10 feet in width and are exposed laterally within a distance of 100 feet. Scheelite crystals generally are about a quarter of an inch in diameter, but a few irregular "spuds" with a maximum diameter of 4 inches, have been extracted. The zones have been mined from a 100-foot drift adit driven southwestward.

About 1,300 feet northeast of the First Landing mine is the Rocky Point mine. Here ore was mined from a tactite zone 6 to 8 feet wide and 40 feet long. The zone is along a limestone-quartz diorite contact that strikes N. 45° W. and dips steeply southwest. Another ore body, 2,000 feet northeast of this tactite zone, was mined from a mass of quartz 40 feet wide and 50 feet long. An ore shoot 10 feet wide and 50 feet long was stoped from an adit driven 50 feet southwest along the long axis of the quartz body.

Milling ore mined from all the deposits from 1939 through 1955 was hauled by truck 3 miles south to the Tungsten Chief mill, which in 1954 was owned by Tap Corporation of Glendale.

Tungsten King (King Tungsten) Mine. Location: SW¼ sec. 23, T. 27 S., R. 32 E., M.D.M., Clear Creek district, 3 miles north of Havilah on the southeast flank of Hooper Hill. Ownership: A. O. Zuck and W. R. Tillman, (1957), Garfield.

The Tungsten King mine was discovered immediately prior to World War I. The earliest operation was during the period 1916-18 when the mine was worked by King Tungsten Mining Company. The next major activity was during the early part of World War II when, under lease to the Fairfield Mining & Milling Company, a 75-ton mill was constructed and operated on the property. The mill received ore from the Tungsten King, Flatiron, Clear Creek, Big Lode, and Miranda mines, all of which were under the management of the Fairfield Mining and Milling Company. Thirty men were employed in the combined operations, which ceased about 1942. Production figures are not available, but probably less than 100 tons of ore was milled. This is reported to have contained between 1 and 2 percent WO_3 (Tucker, 1921, p. 316). The mine has been idle since 1942.

The deposit consists of two parallel scheelite-bearing quartz veins, 25 feet apart, which strike N. 45° E. and dip 65° SE. The country rock is mostly medium-grained biotite quartz diorite, but a large xenolith of argillaceous hornfels is adjacent to the southeastern vein near the principal ore shoot. The veins contain scheelite as disseminated crystals and aggregates of crystals, associated with scattered crystals of pyrite. The scheelite is most abundant mainly near intersections of the veins with cross fractures that strike about N. 10° E. and dip steeply southeastward. The veins range in width from 3 to 6 feet and are exposed several hundred feet northeast from the main adit but do not appear to continue to the southwest.

Development consists of a main drift adit, driven 150 feet northwest, which is intersected by a 35-foot vertical shaft. One ore shoot was stoped in and around the shaft. About 25 feet from the portal, a crosscut was driven 25 feet southwest to the west vein where a 75-foot inclined raise, now caved, was driven northeastward to the surface. An undetermined amount of ore was mined from this raise. A second adit was drive north from the collar of the shaft for a undetermined distance.

Tungstore No. 2 Mine. Location: SE¼ sec. 2, T. 25 S., R. 29 E., M.D.M., White River district, 3 miles southeast of White River, 2½ miles southeast of Bald Mountain. Ownership: John Moore Ranch, Woody (1959).

The Tungstore No. 2 mine was one of the principal sources of tungsten in California between 1940 and 1943. Its production, based on tonnage of ore milled, is estimated to be at least 15,000 units of WO_3. During the early months of 1940, ore was hauled to the Tungstore Mill at Jack Ranch near Posey. Later a 100-ton mill was erected on the John Moore Ranch. An estimated 30,000 tons of tailings at the adjoining millsite are a possible future source of tungsten. The only ore mined since 1943 was a few tons in 1956.

The mine area is underlain by a small roof pendant of pre-Cretaceous metasedimentary rocks enclosed in medium-grained hornblende-biotite quartz diorite. The pendant is irregular and is no more than a few hundred feet in maximum plan dimension. Scheelite is in a tactite mass trending about N. 15° W. which, as exposed in the pit, is 50 to 100 feet wide and is more than 300 feet long. Most of the exposed parts of the pendant apparently are composed of tactite, although recrystallized limestone and schist are present along the east and southwest walls of the pit. The tactite is composed principally of garnet and epidote with subordinate amounts of calcite, quartz, and diopside. Scheelite is in fine, disseminated grains erratically distributed through most of the tactite body. Presumably, as indicated by the shape of the workings, ore was concentrated along a zone near the center of the tactite body. This zone trended about parallel to the tactite mass and was 10 to 30 (?) feet wide.

The Tungstore No. 2 mine was first worked from an adit driven 125 feet S. 15° E. from the northeast end of the tactite body. Then a gloryhole was developed and ore was removed through the adit. Later the adit was abandoned and the ore was mined from a pit-like excavation open at the northeast end. The pit is more than 100 feet wide, 300 feet long, and 50 feet deep (see fig. 110). Sloughing of the walls at the south end of the pit is said to have halted mining in that direction, although the tactite body terminates a few feet farther south. A 10 by 10 foot sump was sunk 20 feet into the floor of the

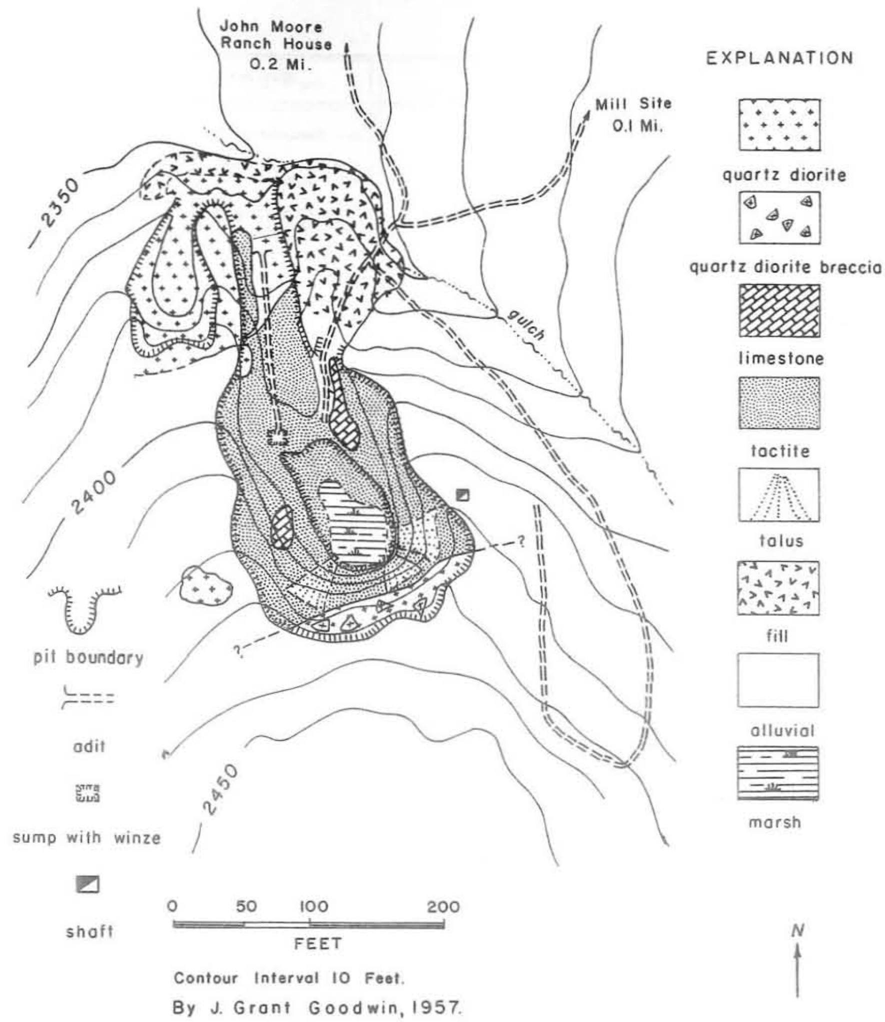


Figure 110. Geologic sketch of the Tungstore No. 2 mine.

pit, exposing the terminus of the abandoned haulage level. From the sump a 40-foot winze was sunk at 45° SW. in tactite. In early 1959, this sump was caved. A small amount of ore was mined from a 15-foot shaft sunk on the southeast rim of the pit in 1956.

Additional ore bodies probably can be developed in the unexplored tactite in the walls and floor of the pit. No diamond drilling or other exploratory work has been done in these areas.

Unip (Embree, Fidgie?) Mine. Location: N½SW¼ sec. 23, T. 27 S., R. 33 E., M.D.M., on west side of Erskine Creek, a quarter of a mile west of Flood Ranch house, 5½ miles southeast of Bodfish. Ownership was not determined in 1956.

The Unip mine, perhaps formerly part of the Fidgie group of six claims, was operated on a small scale by Frank Liebel and family who lived near the mine in the 1940s and early 1950s. It was worked by L. G. Embree, of Kernville, from about 1954 to 1956. Probably at least several hundred units of tungsten concentrates was recovered from ore mined, mostly by Mr. Embree. The mine was idle in 1957 and 1958.

Tungsten is locally in a roof pendant of Paleozoic metamorphic rocks several tens of miles long. In the vicinity of the Unip mine, the pendant is about 1½ miles wide. Scheelite, the principal tungsten mineral, is in scattered grains ranging from pin-point size to a quarter of an inch or more. The grains are disseminated along planes of schistosity and in cross fractures in shear zones, which are mostly in limestone and partly in phyllite, argillite, and hornfels. The schistosity strikes N. 30°-70° W. and dips 70° SW. The main ore zone strikes N. 50° W. and ranges in width from 18 inches to 4 feet. It pinches and swells irregularly both horizontally and vertically, but averages about 2 feet in width. It was at least 70 feet long and 80 feet deep. Neither the maximum depth of the ore zone nor the lateral extent has been determined, although scheelite-bearing float has been found 500 feet west of the main shaft and 350 feet north of it. A western ore body, 100 feet west of the main shaft, is in metamorphic rocks, which strike N. 80° E. and dip 70° S. It apparently was much smaller than the main ore zone.

TUNGSTEN

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	A B C				See Hanover mine.
	Aldridge mine				See Little Acorn mine. (Murdoch 55:146, 277, 292).
	Bald Eagle prospect	Reported in sec. 31, T26S, R34E, MDM, north slope of Piute Mts., 5 miles southwest of Weldon (1942)	Undetermined, 1958	Scheelite in tactite.	Development undetermined. (Jenkins 42: 327t; Tucker, Sampson, Oakeshott 49: 271t).
548	Bald Mountain (Buckeye, Buena Vista) group	SW¼NE¼ sec. 14, T27S, R32E, MDM, Clear Cr. dist., 1½ miles southwest of Bodfish, on the northeast flank of Bald Mt.	Undetermined, 1958; C.B., J., and H. Ross, Bodfish (1921)	Two parallel scheelite-bearing quartz veins, 3 to 6 feet wide, and 500 feet apart. Veins strike N. 35° E. and dip steeply southeast; in biotite quartz diorite. Sparsely-disseminated scheelite crystals are associated with small proportions of pyrite.	Developed by 4 adits at about 50-foot vertical intervals. Two lower adits comprise about 300 feet mostly of drifts. Upper levels largely caved. Several small shipments prior to 1940 totalling probably less than 100 units of WO_3 (Tucker 21:315; 29:62; Tucker, Sampson, Oakeshott 49:272t).
	Baltic mine				See text under gold. (Aubury 04:19t; Boalich, Castello 18:14t; Hess 10:41; Hulin 25:72, 84).
	Baltic Gulch tungsten placer deposit	SW¼ sec. 1, T30S, R40E, MDM, Stringer dist., 1½ miles southeast of Randsburg	Undetermined, 1958; Atolia-Tung-Sun Placer Mining Co., Los Angeles (1943)	Placer gravel derived from schist which contains scheelite-and gold-bearing stringers. Scheelite occurs in rounded fragments some of which also contain quartz. Fragments range in diameter from 1/16 inch to 1 inch. Also free gold. Average grade of approximately 200,00 cubic yards of gravel in Baltic Gulch and parallel gulch to south is 0.50 lbs. scheelite per cubic yard (Chesterman, 1943). Company also had computed reserve of 1,000,000 cubic yards of gravel with average content of 0.2 lbs. scheelite per cubic yard in area west of Union mine (San Bernardino County).	In 1943, included placer material on 8 lode claims in sec. 1 (part of Hess and Gold Coin groups, Red Bird claim and others). Company installed mill capable of treating large daily capacity in sec. 21, T. 29 S., R. 40 E., M.D.M., 3 miles northwest of Randsburg. Mining operation was short-lived, apparently with no recorded production of scheelite.
549	B and F mine	SE¼NW¼ sec. 33, T26S, R34E, MDM, 3¼ miles southwest of Weldon, Piute Mts.	D. H. Blair, La Fern N. Coffey, May L. Zelle; leased to Rene Engel and assoc., P.O. Box 96, Wofford Heights (1958)	Scheelite in tactite.	See text.
550	Barbara-Diana group	SE cor. sec. 2, T30S, R40E, MDM, Stringer dist., 1½ miles south of Randsburg	William A. Stryker, et al, Johannesburg (1958)	Approximately east-trending steeply north-dipping stringers in schist. One high-grade shoot of scheelite discovered and mined in 1951.	Formerly worked for gold in stringers but worked for scheelite in 1951 until shoot was mined out. Several shallow to moderately deep shafts, trenches, and open cuts. Idle since 1951.
551	Basin View mine	Sec. 31 (?), T28S, R33E, MDM, Red Mt. area, 6½ miles east of Breckenridge Mt.	Undetermined, 1958; M. J. Gusty, Isabella, and C. G. Steadfield, 1314 N. Highland Ave., Hollywood (1949)	Scheelite in tactite zone, 3 to 4 feet wide, along contact between limestone and quartz diorite. Tactite consists principally of quartz, epidote, garnet, and calcite with a reported WO_3 content of 1 percent.	Developed by 15-foot shaft and shallow trenches as much as 150 feet long. Shipped less than 5 tons of concentrates in 1944-1945. Idle. (Tucker, Sampson, Oakeshott 49:240, 272t).
	B. C. M. mines				Contraction of Batlin and Carse - lessees of Summit Lime Co. property in 1940's which see under limestone and tungsten. (Tucker, Sampson 43:62).
552	Betty Lou mine	NE¼ sec. 9, T25S, R32E, MDM, 2 3/4 miles northeast of Greenhorn Summit along Deep Cr.	Thomas Maier, Roy Argo, Santa Barbara (1957)	Scheelite in tactite at contact between quartz diorite and coarsely crystalline marble in roof pendant. Zone strikes N. 15° W., vertical. Tactite is composed of epidote, garnet, quartz, diopside, calcite. Marble adjacent to tactite exhibits relict bedding striking N. 30° W., dipping 70° SW.	Workings consist of a short drift adit of undetermined length. Ore was trammed up a steeply inclined track by cable hoist to mine road on ridge above. Production not determined.
	Big Blue group			Scheelite is associated with aplite in the Big Blue group area.	See under gold. Probably no production of scheelite. (Jenkins 42:326t; Prout 40:411).
	Big Raymond mine				See Cyrus Canyon mine.
553	Big Sugar (Big Spud) mine	SW¼SE¼ sec. 9, T25S, R32E, MDM, Greenhorn Mts., 2 miles northeast of Greenhorn Summit, between Cow and Calf Creeks	Melvin M. Ford, P.O. Box 293, Inyokern, and Oscar Lipnitz, Glennville (1954)	Scheelite in fault gouge-tactite zone along a contact between quartz diorite and limestone. Zone contains, garnet, smoky quartz, and unusually large, well terminated epidote crystals.	Developed by timbered shaft of undetermined depth. Mined 40 to 60 tons of ore in 1954 which averaged .32 percent WO_3. Source of epidote and smoky quartz crystals for mineral collections. (Murdoch 55:147, 277).

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Big Tungsten mine				See Big Gold mine under gold. (Jenkins 42:330t: Tucker, Sampson, Oakeshott 49: 272t).
554	Billie Burke mine	SE¼ sec. 35, T29S, R40E, MDM, southeast part of Randsburg	Mrs. Kathleen M. Jewell, Randsburg (1957); under lease to Treg Minerals Co., Johannesburg	Irregular masses of scheelite in silicified schist in footwall of gold-bearing, iron-stained fault zone. Scheelite occurs both as isolated grains, ranging in width from one-quarter inch to more than one inch, and as lenses and veins as much as 8 inches thick and a few feet long. Scheelite-bearing zone appears to be a shoot about 30 feet long, 4 to 6 feet thick, and extends 150 feet downward from surface. Gold-bearing vein strikes N. 70° W., dips 55° SW.; scheelite-rich zone approximately parallel to it. Scheelite content of mined ore probably more than 1 percent.	Also gold. One patented claim. Developed by two 100-foot inclined shafts about 60 feet apart, 80 feet of drifts on 100-foot level, and an underhand stope about 50 feet deep below east shaft. Both shafts originally developed for gold. In 1956, east shaft was enlarged by raising in scheelite ore from 100-foot level to surface. Not credited with production of gold but probably several tens of units of scheelite produced by lessees in 1956-1957. Idle since June 1957. (Tucker, Sampson 33:272t).
	Blackbird prospect				See Easter prospect.
555	Black Mountain King mine	NW¼ sec. 27, T25S, R32E, MDM, Greenhorn Mts. 1½ miles southeast of Greenhorn Summit, 1½ miles east of Evans Rd., near powerline	W. Sam Huckabay, c/o Kern County Park Dept. (1956)	Scheelite in tactite.	See text.
	Blue Bird, Black King, Hi-Girl, and Hi-Peak claims				See Hi-Peak group. (Jenkins 42:327t).
556	Bluebird (Capitola) group	NW¼ sec. 12, T30S, R40E, MDM, Stringer dist., 2 miles south of Randsburg	E. M. Sain, address undetermined (1957)	Scheelite-bearing quartz veins in schist. Veins strike approximately east, dip 40-45° N. and range in thickness from 2 inches to 2 feet. Vein can be traced for approximately 300 feet on 100-foot level. Average grade of ore composed of quartz with irregular masses and crystals of scheelite is about 1½ percent WO_3.	Three claims. Undetermined output of scheelite in 1940's and 1950's and few tens of ounces of gold in late 1920's. Developed by 35° inclined shaft to 150 foot depth with approximately 1,000 feet of drifts on 3 levels. Idle. (Chesterman 44:4; Partridge 41:286. Tucker 29: 62).
557	Blue Point prospect	Corner secs. 10, 11, 14, 15, T30S, R36E, MDM, Redrock Cyn. dist., 1 mile north of Blue Point in Jawbone Cyn.	Undetermined (1957)	Crystals of wolframite and scheelite in widely separated small lenses within brecciated and sericitized granitic rocks in a west-trending zone which is about half a mile long and a quarter of a mile wide.	Developed by small open cuts, short shafts, and trenches. Has yielded a few hundred pounds of ore-grade material and specimens for mineral collections. A prospect; long idle. (Jenkins 42:330t; Partridge 41:312-313; Tucker, Sampson, Oakeshott 49:272t).
558	Bright Star prospect	NW¼ sec. 4, T27S, R34E, MDM, 4 miles southwest of Weldon, on small knoll on west side of Long Cyn. north flank of Piute Mts.	Ernest E. Bartell, address undetermined (1957)	Sheared quartz vein, 2 to 5 feet wide, strikes N. 35° W., vertical; in dark silicified quartz-sericite schist and fine-grained diorite. Vein exposed for about 300 feet along surface and locally is along pods of diopside-rich rock. Vein contains faint green copper stains and minor iron stains.	May be a gold prospect, also. Developed by vertical shaft about 50 feet deep. Production undetermined. Idle.
	Buck	Reported in sec. 6, T26S, R33E, MDM, (1942); not confirmed, 1957	Undetermined, 1957; Robert L. Coughran, address undetermined (1942)	Scheelite in tactite.	Uncorrelated name. May be listed herein under different name. (Jenkins 42: 326t).
	Buckeye prospect				See Bald Mt. group.
559	Buckhorn mine	SE¼ sec. 27, T28S, R32E, MDM, on Red Mt., 4 miles east of Breckenridge Mt.	N. A. Kessler, 4528 Cockerham Dr., Los Angeles (1955)		See text.
	Buckhorn	Greenhorn Mt. Tungsten area			See Lucky Hit deposit in text. (Jenkins 42:325t; Tucker, Sampson, Oakeshott 49: 272t).
	Buena Vista prospect				See Bald Mt. group.
560	Butte (Hillside) mine	S½SW¼ sec. 17, T25S, R32E, MDM, Greenhorn Mts. 1 mile northwest of Greenhorn Summit on south flank of a three-peaked mountain	Eva C. Hitchcock, Glennville (1957)	Scheelite in tactite.	See text.
	Butte prospect	Rademacher dist.			See under gold. (Boalich, Castello 18:12t).

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
561	Cadillac (Rand) mine	S½ sec. 7, T25S, R32E, MDM, Greenhorn Mts., about 1 mile southwest of Big Sunday Pk.	Walter Kubon & Urho A. Jurva, 419 N. Emily, Anaheim (1957)	Scheelite-bearing tactite in a contact zone of marble and quartz diorite. The tactite is composed of epidote, garnet, quartz, and calcite. Pyrite is also present.	Deposit is exposed along the south of Cedar Cr. for a short distance. Between 100 and 150 tons of ore that averaged 2.9% WO_3 was mined during the years 1948-1950. (Hess 22:265; Jenkins 42: 325t; Partridge 41:300-301; Storms 16: 768; Tucker, Sampson, Oakeshott 49:272t).
	Cape Horn	Vicinity of Bodfish (1904); not confirmed, 1958	Undetermined, 1958; Ed Lieb, Vanghn (Bodfish) (1904)		Uncorrelated old name; locality undetermined (Aubury 04:9t).
	Carter placer	Stringer dist.	Undetermined, 1958; A. M. Carter, address undetermined (1918)		Uncorrelated old name. May be property listed herein under different name. (Boalich, Castello 18:12t).
562	Charles Reeves mine	NW¼SE¼ sec. 2, T25S, R29E, MDM, 2½ miles southeast of White River, on a north-trending ridge	Charles Reeves, Woody (1956)	Scheelite in tactite.	See text.
563	Christmas Tree prospect	N½ sec. 14, T27S, R33E, MDM, 5¼ miles east of Bodfish in northwest part of Piute Mts., head of Spring Gulch	John Hunt, 1530 Niles St., Bakersfield, and Gale Goodman, address undetermined (1957)	Coarse crystalline iron-stained garnet-epidote tactite along contact between metamorphic rocks and quartz monzonite. Tactite strikes N. 50° W., dips 45° NE. Exposed in 50 feet open cut near divide between Spring Gulch and Lynch Cyn. and in northwest-driven drift several tens of feet southeast below open cut. Scheelite content of tactite not determined.	Five claims. Developed by surface stripping, open cuts, short drift adits and inclined shafts, and 20-foot vertical shaft. Longest open cut is 50 feet long and 15 feet deep along contact between quartz monzonite and metamorphic rocks. Other small workings in small pendants a few hundred feet east of main workings at east end of steep road. Undetermined production in 1955.
	Claude mine				See Minnehaha mine in text.
564	Cluff Ranch prospects	One in SE¼ sec. 30, T10N, R16W, MDM, Canada del Agua Escondida, another in SE¼ sec. 28, T10N, R16W, MDM (proj.), near Cyn. del Secretario, 15 to 17 miles northeast of Gorman, on southeast flank of Tehachapi Mts.	Tejon Ranch Co., P.O. Box 1560, Bakersfield (1958)	Scheelite in garnet-rich tactite along the edge of limestone inclusions in quartz diorite and granite. Tactite bodies are small and probably extend downward only a few tens of feet. (Wiese, 1950, p. 48).	Developed by prospect pits. No production (Wiese 50:48).
	Consolidated mines				See text under gold. (Boalich, Castello 18:12t; Tucker, Sampson, Oakeshott 49: 272t).
	Corporal BEK (Texas Star No. 1, No. 2) prospect	Reported in sec. 4, T29S, R32E, MDM, Red Mt. area, about 6 miles south of Havilah (1941); not confirmed, 1958	Undetermined, 1958; T. J. and N. T. McKee (1941)	Scheelite in tactite which can be traced 3,000 feet to the Wall Street group to the north. Kidney of ore near top of hill reported to assay 11 to 12 percent WO_3 (Partridge, 1941, p. 301).	No recorded production (Partridge 41: 301).
565	Cow Canyon group	Reported in sec. 12, T25S, R36E, MDM, Sierra Nevada, 2½ miles east of State Hwy. 138 (1949); not confirmed, 1958	Undetermined, 1958; A. N. Houser, Weldon W. P. Lewis, Trona (1943)	Scheelite in tactite.	Developmend undetermined. Probably a prospect. (Tucker, Sampson 43:121; Tucker, Sampson, Oakeshott 49:272t).
	Crowbar Gulch prospect			Scheelite in tactite.	See under tin (Wiese, Page 46:49).
566	Cyrus Canyon (Big Raymond, Raymond, Syrus Canyon) mine	SE¼ sec. 26, T25S, R33E, MDM, 2½ miles southeast of Kernville, on top of ridge north of Cyrus Cyn.	Cecil W. Pascoe, P.O. Box 42, Kernville and Earl Pascoe, Wofford Hts. (1958); leased to Rene Engel and Assoc., Wofford Hts. (1958)	Area is underlain by gabbro which contains a sliver of pre-Cretaceous metamorphosed limestone and quartzite, 5 feet wide and several hundreds of feet long. Small aplite dikes are common in gabbro. Scheelite occurs as thin coatings and scattered grains in metasedimentary rocks. Septum-like body pinches and swells with feathery reentrant contacts with gabbro.	Four claims - Big Raymond Nos. 1, 2, 3, and 4. The deposit is explored by a 45-foot vertical shaft with a 40-foot drift on the 30-foot level. (Jenkins 42:326t; Tucker, Sampson 40b:333; Tucker, Sampson, Oakeshott 49:275t).
	Digger Pine mine				See High Enough mine in text.

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
567	Donlevy (Orrell group) mine	South-central sec. 14, T29S, R34E, MDM, Piute Mts. area, 2 3/4 miles southeast of Claraville, about ½ mile southwest of Lowell Pk.	Undetermined, 1958; Lee Orrell, Weldon: under option to Donlevy Development Co., R. W. Prout, Pres., and Mgr., San Fernando (1949)	Two quartz veins, 2 to 6 feet wide, occupy shear zones striking W. to N. 60° E. and dip 55° S. through granodiorite. Veins and stringers contain traces of oxidized pyrite and scheelite. Assays ranged from 0.65 to 2 percent WO_3 in southeast vein and averaged 1 percent in northwest vein; 11 tons of high-grade ore mined in 1944 from kidneys which reportedly contained 50 percent WO_3.	Developed by 2 drift adits, 90 feet apart vertically. Upper adit, 285 feet long on southeast vein, developed 4 ore shoots, each 2 to 4 feet wide and 30 feet long. Lower adit driven 425 feet N. 75° E. along planar hanging wall mud seam, developed ore shoot 100 feet long, 2 feet wide. In 1955, timbers were in dangerous condition, with much water and rock fall. Last known active 1943-1944, production undetermined. Mill removed by 1955. (Jenkins 42:329t; Tucker, Sampson 43:62; Tucker, Sampson, Oakeshott 49:240-241, 272t).
	Dorris and Cuddeback property				See Stardust mine in text. (Tucker, Sampson 43:62).
568	Easter (Blackbird) prospect	NW¼ sec. 26, T27S, R32E, MDM, Clear Cr. dist., 2½ miles north of Havilah on northeast slope of a small hill south of Hooper Hill and ¼ mile west of Bodfish-Caliente Rd.	Herman J. Kutzner, P.O. Box 628, Tehachapi, Charles Fluhart, P.O. Box 561, Kernville (1957)	Iron-stained quartz vein, 1 to 4 feet wide, strikes N. 30° E., dips 65° SE.; in granitic rock.	Development limited to a caved drift adit driven S. 30° W. for an undetermined distance. Idle.
	Edwards-Ploomy group				Former claim names of Hess group, which see. (Boalich, Castello 18:13t).
569	El Diablo (Jackpot (?), Pappy, Tungsten Queen) mine	NW¼ sec. 31, T25S, R33E, MDM, 1½ miles northwest of Wofford Hts. and north of paved road to Greenhorn Summit	Mr. Pappy Hall, Isabella (1957)	Scheelite in tactite.	See text. (Jenkins 43:326t; Tucker, Sampson 41:579; Tucker, Sampson, Oakeshott 49:272t).
	Embree property				See Unip mine in text.
570	Esperanza prospect	NW¼ sec. 26, T11N, R14W, SBM, 10 miles west of Mojave, on southeast flank of Tehachapi Mts.	Tilo Lopez, address undetermined (1958)	Scheelite-bearing tactite bodies along contact between pre-Cretaceous limestone and quartz monzonite.	Three lode claims: Esperanza, La Rondeaner, Buena Vista. Explored by several open cuts. No production.
571	Fernandez group	SE¼ sec. 34, SW¼ sec. 35, T25S, R37E, MDM, southwest side of Indian Wells Cyn., 10 miles northwest of Inyokern	Paul McKenry, Inyokern (1957)	Scheelite crystals, as much as one inch in diameter, occur principally in tactite inclusions in diorite and much less abundantly in quartz veins. Tactite bodies range from few feet to several hundred feet in length. Scheelite is in discontinuous lenses within the tactite. A scheelite-bearing quartz vein, from 4 inches to 2 feet wide assayed 0.18 percent WO_3 at one point where it was two feet wide. (F. H. Weber, Jr., 1956).	Six unpatented claims. Workings consist of several hundred feet of cuts by bulldozing, four short adits, and a shallow shaft. A few tens of tons of tactite with from about 0.2 percent to 0.45 percent WO_3 were exposed in short adits. Idle. (Unpub. rept. by F. H. Weber, Jr., 1956).
	Fidgie group	Reported in sec. 23, T27S, R33E, MDM (1949)		Scheelite with molybdenite and powellite in tactite.	Probably former name of the Unip mine. (Jenkins 42:328t; Tucker, Sampson, Oakeshott 49:273t).
572	F O B (Pyavin) mine	NE¼ sec. 11 and cen. W½ sec. 12, T26S, R37E, MDM, southwest side of Indian Wells Cyn., 9 miles northwest of Inyokern	Jack Warner, Grant P. Merrill, Mojave, A. L. Crowthers (1957)	Scheelite in garnet-epidote tactite layers in metasedimentary rock. Tactite layers occur mostly adjacent to limestone, strike NW., and dip steeply NE. Layers are as much as 12 feet thick and several tens of feet long. Scheelite occurs as grains which range from minute-sized to more than an inch in diameter. Average grade of ore is probably 1 percent WO_3 or less but locally is as much as 3 percent. Ore bodies are discontinuous within the tactite.	Twenty unpatented lode claims. Exploration and mining done in trenches and short drift adits mostly on F O B No. 2 claim. Undetermined production before 1950; small production in 1950. Most of development work and mining done by lessees. (Jenkins 42:327t; Tucker, Sampson 43:121; Tucker, Sampson, Oakeshott 49:273t, 274t).
573	Four K prospect	SW¼ sec. 26, T27S, R32E, MDM, Clear Cr. dist., 2 miles north of Havilah, on a small hill east of Clear Cr.	Herman J. Kutzner, P.O. Box 628, Tehachapi (1957)	Scheelite in two parallel quartz veins in coarse-grained biotite quartz diorite. Veins strike N. 25° E. dips 75° E., range in width from 2 to 6 feet, and contain coarse scheelite crystals.	Located in 1941 and, reportedly, yielded 10 tons of ore which averaged from 1 to 3 percent WO_3. Total production is probably less than 100 tons of ore. Workings consist of two crosscut adits, 20 feet and 30 feet long, a 20-foot shaft, and a 25-foot drift adit. Idle. (Jenkins 42:327t; Tucker, Sampson 41: ; 575; Tucker, Sampson, Oakeshott 49:273t).
574	Gardner shaft (of Atolia Mines)	NE¼SE¼ sec. 24, T30S, R40E, MDM, Atolia mining district 4½ miles south-southeast of Randsburg	Surcease Mining Co. P.O. Box 786, Sacramento (1958)	Scheelite-bearing quartz-carbonate veins along faults in quartz monzonite.	See text.

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Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	G. B. mine				See under gold. (Boalich, Castello 18:13t; Hess 10:40, 41; Hulin 25:72, 84).
	General Mac-Arthur prospect	Reported in SW¼SW¼ sec. 2 (12?) and sec. 14, T10N, R15W, SBM, 16 miles southwest of Mojave, on ridge west of Gamble Cyn. (1941); not confirmed, 1958	Undetermined, 1958; L. M. Allen, 609 Alexander St., San Fernando (1941)	Not described.	An undeveloped prospect in 1941. (Jenkins 42:332t; Tucker, Sampson 41: 575; Tucker, Sampson, Oakeshott 49:273t).
	Gold Crown group				See under gold. (Boalich, Castello 18: 13t; Brown 16:522t; Partridge 41:287).
	Gold Flint prospect				See under gold. (Boalich, Castello 18:12t).
575	Gold Wash (Ben Hur) mine	SE¼ sec. 1, T30S, R40E, MDM, Rand dist., 2 miles southeast of Randsburg, principal shaft in San Bernardino County	Edw. Herkelrath estate (?), Randsburg (1957)	Iron-stained stringers and veins in bluish-gray siliceous schist locally contain small proportions of silver minerals. Strike N.-NE., dip fairly steeply E.-SE. Scheelite occurs as small irregular masses in stringers.	Patented mining claim. Shaft, 400 feet deep with 1,735 feet of horizontal workings on three levels, was developed by Ben Hur Divide Mining Co. in search for rich silver veins. Work discontinued in 1923. Scheelite production undetermined but probably only a few units from small irregular workings on surface northwest from shaft collar. (Hulin 25:129; Jenkins 42:330t; Tucker, Sampson 31:342; Tucker, Sampson, Oakeshott 49:273t).
576	Good Enough (Gribble group) prospect	SW¼ sec. 17, T25S, R32E, MDM, Greenhorn Mts., 7½ miles east of Glennville on northwest slope of a three peaked mountain 4,000 feet east of the Cedar Cr.-highway crossing	Lee Hitchcock, Glennville (1957)	Scheelite tactite.	See text. (Tucker, Sampson 43:63; Tucker, Sampson, Oakeshott 49:263t).
577	Good Hope (Tungsten Chief) mine	Center, S½ sec. 27 T28S, R32E, MDM, 3 miles east of Breckenridge Mt., on west slope of Red Mt.	Mike J. Gusty, Isabella (1957)	Scheelite in tactite.	See Tungsten Chief mine in text.
	Good Hope mine				See Tungsten Chief in text. (Partridge 41:250-251, 258).
	Good Hope mine				See Little Dick mine in text (Partridge 41:301-302; Tucker, Sampson 43:62-63; Tucker, Sampson, Oakeshott 49:273t).
578	Grandad (Miranda) mine	NE¼ sec. 1, T26S, R33E, MDM, 6½ miles northeast of Isabella Dam at the head of a southeast tributary of Cyrus Cyn.	L. A. and J. B. Purinton, P.O. Box 72A, Kernville (1955)	Scheelite in tactite.	See text. (Jenkins 42:327t; Partridge 41:303; Tucker, Sampson 40b:332-333, pl. 2; Tucker, Sampson, Oakeshott 49: 274t).
	Grannis Land Co. property	Sec. 36, T29S, R40E, MDM, Johannesburg	Undetermined (1957) John W. Luter, Randsburg (1918)		See under gold (Boalich, Castello 18: 13t).
	Green Monster prospect	Reported approximately 12 miles east of White River (1931); not confirmed, 1957	Undetermined, 1957; George J. Evans (1931) address undetermined	Cuproscheelite occurring with radiating black tourmaline crystals.	Old name. Probably abandoned prospect. (Partridge 41:313).
	Gribble group				See Good Enough prospect in text and Lucky Strike deposit in tabulated list.
	Gwynne mine			Scheelite occurs with gold in quartz veins in granitic rock.	See under gold. (Tucker, Sampson, Oakeshott 49:224).
579	Hawk (Sunset) prospect	NW¼ SW¼ sec. 6, T30S, R40E, MDM, Rand dist., 4 miles west-southwest of Randsburg	W. H. Lovett, M. J. Lovett, Jr., Randsburg (1957)	Scheelite-bearing tactite layers of undetermined thickness and quartz veins in quartzite, limestone, gneiss, and schist. Veins, 2 to 6 inches, wide strike N. 75° W., vertical. Scheelite distribution spotty. Beds strike into alluvium a few tens of feet east and west from the exposures of tactite in small hill.	Two claims. Development consists of 35-foot shaft, several shorter shafts, and shallow trenches. Short crosscut adit extended N. 15° E. to intersect quartz stringers. Production undetermined. Idle. (Jenkins 42:331t; Partridge 41:313; Tucker 21:316; 29:63; Tucker, Sampson, Oakeshott 49:275t).
	Herschel Kelso prospect				See Trixie prospect. (Hess 22:264-265; Partridge 41:302; Tucker, Sampson, Oakeshott 49:273t).

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
580	Hess group	SW¼ sec. 1, T30S, R40E, MDM, Stringer dist., 1½ miles south of Randsburg	Max Hess, Johannesburg (1958)	Approximately east-trending scheelite-bearing stringers in schist. Also contains at least several hundred cubic yards of scheelite-bearing placer material.	Four unpatented claims. Formerly Edward-Ploomy group. Developed by several shallow shafts in the stringers, and trenches in placer material. Probably small production.
581	High Enough (Digger Pine) prospect	Approx. center of west edge of sec. 7, T27S, R35E, MDM, 5 miles south-southeast of Weldon, Piute Mts.	Marion M. Nicoll, John W. Nicoll, Rubylee Hess, Carl G. Allen, Weldon (1957)	Scheelite in tactite.	See text.
582	High-Low mine	NE¼NW¼ sec. 29, T30S, R36E, MDM, north side of Jawbone Cyn., 6½ miles northwest of Cinco	Rudnick estate Trust, Bakersfield (1957)	Scheelite in irregular fractures in granodiorite.	A 60-foot inclined shaft, 10-foot shaft, 30-foot drift adit, and several shallow pits. A total of about $12,000 worth of WO_3 was mined (unconfirmed) in 1954 from ore averaging 0.5 percent WO_3 in the 60-foot shaft. Idle.
583	High Power (Powerline) mine	S½ NW¼ sec. 20, T25S, R32E, MDM, Greenhorn Mts., 8 miles east of Glennville, ¾ mile south of Evans Rd.	A.R.O. & M. Corp., M. Brandini, Bakersfield (1957)	Scheelite in tactite near eastern margin of metamorphic roof pendant.	See text. (Jenkins 42:325t; Tucker, Sampson, Oakeshott 49:273t).
	Hillside mine				See text under Butte mine.
584	Hi-Peak mine	Center sec. 10, T26S, R38E, MDM, vic. Indian Wells Cyn., 4½ miles northwest of Inyokern, ½ mile west of U.S. Hwy. 6	U.S. Flare Corp., 12270 Montague, Pacoima (1957); leased to Hatton and Carlson Mining and Milling Co., 111 S. Broadway, Inyokern	Scheelite in tactite.	See text. (Elliott 43:1-5; Jenkins 42:327t; Tucker, Sampson 41:579; Tucker, Sampson, Oakeshott 49:241, 273t).
	Hobby mine				See Naja mine.
585	Holly Rand mine	SW¼ sec. 11, T30S, R40E, MDM, Rand dist., 2¼ miles south-southwest of Randsburg, on southeast flank of Rand Mts.	Warren E. Devel, address undetermined (1957)	Scheelite-bearing shear zone in schist strikes N. 70° W., dips 55° SW. A bedding plane shear zone, which strikes N. 10° W. and dips 30° W., probably also contains scheelite. South end of bedding plane shear zone is truncated by N. 70° W.-trending shear zone.	Five patented claims. Undetermined output of scheelite in 1950's from 40-foot open cut extending N. 70° W. and a N. 10° W.-trending trench extending a few feet from face of open cut. Inclined shaft, about 200 feet to southeast from above workings, appears to be sunk on east-trending zone which dips about 65° N. Moderately large dump at inclined shaft; extent of workings undetermined. Probably originally developed as gold prospect but worked for tungsten in recent years. See also Big Indian mine under manganese. Idle.
	Howe group	Reported in sec. 23, T27S, R32E, MDM, Clear Cr. dist., southwest slope of Hooper Hill (1921); not confirmed, 1958	Undetermined, 1958; J. C. Howe, Havilah (1921)	Scheelite in quartz veins in granitic rock.	Uncorrelated old name. May be listed herein under another name. (Jenkins 42:327t; Tucker 21:315; Tucker, Sampson, Oakeshott 49:273t).
	Ideal group	Reported approx. sec. 20, T25S, R32E, MDM (1949); not confirmed, 1957	Undetermined, 1957; J. C. Rook, Glennville (1949)	Scheelite in tactite at quartz-diorite and limestone contact.	Uncorrelated old name. Probably listed herein under other name(s). Formerly a part of Sierra Tungsten group (?); King, Hershel Kelso, Owl. (Jenkins 42:325t; Tucker, Sampson 41:576; Tucker, Sampson, Oakeshott 49:273t).
	Iron Mountain (Iron Mountain Wonder) prospect				See under iron. (Brown 16:516; Eric 48:255t; Tucker 29:56; Tucker, Sampson, Oakeshott 49:270t; Turner 02:547).
	Jackpot mine				See El Diablo mine.
586	Jane No. 1 prospect	Reported sec. 22, T27S, R32E, MDM, 3/4 mile south of Hobo Hot Springs, 1/3 mile west of Clear Cr. (1955); not confirmed, 1957	V. W. Sorensen, 922 W. 7th Pl., Los Angeles 17 (1957)	Scheelite-bearing quartz veins in granitic rock. Owner reports average assay 3.73% WO_3 (personal communication)	Development undetermined.
587	Jersey Lily group	NE¼ sec. 12, T30S, R40E, MDM, Stringer dist., 2¼ miles southeast of Randsburg	Undetermined, 1957		Patented mining property worked by Monarch Rand Mining Co. as part of Monarch Rand group in early 1920's. Probably small output of gold and scheelite and traces of silver. (Partridge 41:288; Tucker 29:58).
	J. Hodgson	Reported about half a mile from Granite King mine	Undetermined, 1957; J. Hodgson, San Francisco (1914)	Huebnerite.	Probably same as Blue Point prospect. (Brown 16:522; Partridge 41:313).

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	June Ione mine				See Major mine in text. (Hess 22:265-266; Partridge 41:302-303; Jenkins 42: 305t; Tucker, Sampson, Oakeshott 49: 274t).
588	Juniper prospect	NW¼ sec. 7, T27S, R35E, MDM, 5¼ miles south-south-east of Weldon, at mouth of east-draining stream channel 3 miles southeast of Nichols Pk.	John W. Nicoll, Weldon (1957)	Vertical, N. 70° W.-striking layered garnet-epidote tactite body in layered pale calc-silicate horn-fels. Tactite crops out on surface for about 100 feet and is an average of 3 to 4 feet in thickness. Schee-lite unevenly distributed in tactite. Quartz monzonite occurs on northeast boundary of metamorphic rocks a few feet from layered tactite. Tactite offset about 80 feet to northeast along cross fault about 100 feet from drift portal. Offset segment crops out an additional 100 feet to NW.	Developed by drift adit driven few tens of feet N. 70° W. in tactite, a 10-foot deep shaft about 50 feet northwest of portal of drift, and three 10-foot shafts on segment of tactite offset to the northeast. Probably no production. Idle.
589	Kerntung group	NW¼ sec. 24, T26S, R37E, MDM, 2 miles northeast of Free-man Cyn., 8 miles northwest of Inyokern	Kerntung Mining Co., P.O. Box 968, Bakersfield (J. B. Kasey, Les Sandes, Charles Hauser, et al.,) (1957)	Scheelite-bearing lenses of garnet-epidote tactite in metasedimentary rocks which strike NW., dip steep-ly NE. Lenses are maximum of few feet long and few inches thick. Discovery of rich float in nearby canyons has caused exploration of area.	Nine unpatented lode claims, 3 unpat-ented placer claims. Three small pros-pect pits dug at crest of ridge between Freeman Cyn. and Indian Wells Cyn. A two-rail tram about 400 feet long was installed on the side of the mountain at the end of the road from Freeman Cyn. A prospect; idle.
	King	Reported approxi-mately sec. 17, 20, T25S, R32E, MDM, Greenhorn Mts.; not confirmed, 1957	Undetermined, 1957		Uncorrelated old name. Probably listed herein under other name(s). Formerly part of Sierra Tungsten group (?): Ideal group, Herschel Kelso, Owl. (Jenkins 42: 325t; Tucker, Sampson, Oakeshott 49:273t).
	King Tungsten mine				See Tungsten King mine in text. (Tucker 21:315, 316; 29:62).
590	Last Chance mine	Cen. S½ sec. 34, T26S, R34E, MDM, 3½ miles south of Weldon, Piute Mts.	Rene Engel and Louis Zelle own 4 claims; leased to Rene Engel and Associates, P.O. Box 96, Wofford Heights (1957)	Scheelite in elongate bodies of garnet epidote tactite.	See text.
	Lila King group				See Stringer district placer mines in text.
591	Lily prospect	Approx. N. edge of sec. 13, T30S, R39E, Rand dist., 5 3/4 miles south-west of Randsburg	John L. Collins, 1825 Taft Ave., Los Angeles 28; Ray Duran and John Shelburn, Rands-burg (1958)	Scheelite in discontinuous lenses and stringers in fault zone in schist. Zone strikes N. 35°-70° E., dips steeply NW. Stringers of nearly pure scheelite were found in parts of fault zone.	Seven claims. Developed by 46-foot shaft and approximately 100 feet of drifts to east and northeast at 46-foot level. Production undetermined. Idle.
592	Little Acorn (Aldridge) mine	NW¼ sec. 27, T25S, R32E, MDM, 1½ miles southeast of Greenhorn Summit on the lower south flank of Black Mt.	Royal C. Gould, P.O. Box N135, China Lake (1954)	Well formed transparent crystals of scheelite with quartz and dissemin-ated in sheared tactite bodies with-in granitic or migmatite rock. Ore bodies are narrow and have maximum length of 20 feet. Tactite is com-posed principally of garnet, epidote and quartz.	Development consists of 10-foot, 40-foot, and 170-foot adits and small open cuts. Total production is about 20 tons of ore which was milled at the Black Mt. King mill about ½ mile to the south-east. Source of smoky quartz crystals. (Murdoch 55:277).
	Little Chief	Vicinity Elmer (1904); not con-firmed, 1958	Undetermined, 1958; Chas. Mercer, Elmer (1904)	Quartz in granite.	Uncorrelated old name; probably long abandoned prospect. (Aubury 04:13t).
593	Little Dick (Good Hope) mine	NE¼ sec. 23, T25S, R33E, MDM, 1½ miles southeast of (new) Kernville	Cecil W. Pascoe, P.O. Box 42, Kernville (1958)	Scheelite in tactite.	See text. (Jenkins 42:326t; Partridge 41:250, 251, 258, 301, 302; Tucker, Sampson 40b:332; 43:62, 63; Tucker, Sampson, Oakeshott 49:273t).
594	Little Wonder prospect	NW¼ sec. 35, T28S, T32E, R32E, MDM, south side of Red Mt., 6 miles south of Havilah	Tap Corp., Glendale (1954)	Sparsely disseminated scheelite in 4 to 6 foot-wide zones of tactite in mica schist. Trend northwest.	Short tunnels; mostly caved in 1954. Production undetermined. Idle. (Jen-kins 42:329t; Tucker, Sampson, Oake-shott 49:273t).
595	Locarno (Locarno-Simon) mine	SE¼SE¼ sec. 21, and NE¼NE¼ sec. 28, T29S, R34E, MDM, Piute Mts. area, 3½ miles south of Clara-ville, high on north wall of cyn. drained by Caliente Cr. tri-butary	N.V. Franceschi, 325 Fifth Ave., Venice, owns 97 acres of patented ground (1958)	Scheelite- and gold-bearing quartz veins, 1 to 4 feet wide, strike N. to N. 30° E., dip 40° - 50° SE.; in granitic rock. Ore contained reported \$15 per ton in gold; scattered bunches of scheelite along footwall contain 60 percent WO_3. Soil on surface of outcrop contains much weathered country rock and fragments of scheelite in placer deposit that contains 0.25 to 0.5 percent WO_3.	Southeast vein developed by 500-foot drift adit, driven N. 30° E., with 110-foot raise to surface 230 feet from portal. Second adit, 130 feet lower, driven 550 feet N. 30° E., with 90-foot winze sunk 410 feet from portal. About 200 feet east of lower adit portal, open cuts and about 300 feet of level workings explore N.-trending vein and placer deposit. Intermittently mined from 1924 to 1942, yielding about \$6,000 in gold. Some 50 sacks of tungsten ore containing 50 percent WO_3 reported mined in 1941. Mill con-structed 1953 but no production resulted.

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
595	Locarno (Locarno-Simon) mine (continued)				Simon workings, quarter of a mile south of Locarno workings, include 4 adits totalling 400 feet, with 500 feet of drifts, and several winzes, all caved during 1940's. Production small but undetermined. (Jenkins 42:329t; Tucker, Sampson 41:576; 43:63-64; Tucker, Sampson, Oakeshott 49:228, 263t, 274t).
	Lode, The mine	Reported in sec. 26, T26S, R34E, MDM, (1940); not confirmed, 1958			Probably same as Last Chance mine in sec. 34. (Tucker, Sampson 40b:332; 43:64).
596	Lucky Boy prospect	Approx. center sec. 2, T28S, R40E, MDM, Rademacher dist., 6½ miles southeast of Ridgecrest	Mr. Borthick, Downey (1957)	Irregularly disseminated scheelite in small pendant of dark siliceous fine-grained metamorphic rocks. Pendant enclosed in quartz monzonite.	Developed by irregular, steep shaft about 40 feet deep and short drift adit. Reported by Marvin Harris (personal communication, 1957) to have yielded a few units of tungsten concentrates.
597	Lucky Boy prospect	NE¼ sec. 18, T27S, R35E, MDM, 6 miles south-southeast of Weldon, west side of Kelso Cr., on gentle slope of Piute Mts.	R. J. Garcia, 310 F. St., Bakersfield, and R. V. Ballagh, 209 La Verne, Long Beach (1957)	Fine- to coarse-grained scheelite in dark green tactite. The tactite occurs in two lenses or layers each about 30 feet long within a poorly-exposed pendant approximately 100 feet wide and 250 feet long. A tactite body at a 90-foot shaft is about 4 feet wide, strikes N. 60° W., and dips 60° SW.; another, about 100 feet to the northwest, strikes N. 75° E., dips 40° SE., and is exposed in a trench. An open cut extending 100 feet from the 90-foot shaft is developed along a N. 25° W.-trending shear zone which transects metamorphic rocks and quartz monzonite. Green copper staining is common locally along the shear zone. The 90-foot shaft is at the projected intersection of the shear zone and is probably the source of the mined scheelite.	Formerly Big Cedar No. 1, located by Frank Feldman March, 1913. Developed by an irregular 40-foot vertical shaft with 50 feet of drifts, a 20-foot vertical shaft, and a 100-foot open cut all in line on a N. 25° W. bearing. Shallow open cuts and trenches elsewhere. An undetermined amount of scheelite has been produced from this mine in recent years. (John W. Nicoll, personal communication).
598	Lucky Hit (Buckhorn, Why Not) deposit	N½ sec. 19, T25S, R32E, MDM, Greenhorn Mts. ¼ mile east of Cedar Cr. Campgrounds, 100 feet above paved rd.	Don E. Lewis, Summit Lodge, Glennville, Walter Hitchcock, Glennville (1957)	Disseminated scheelite associated with pyrite and chalcopyrite in tactite.	See text. (Hess, Larsen 22:264; Jenkins 42:325t; Partridge 41:305; Tucker, Sampson Oakeshott 49:272t).
599	Lucky Strike (Gribble group) deposit	S½SW¼ sec. 17, NW¼ sec. 20, T25S, R32E, MDM, Greenhorn Mts., 3/4 mile due east of Cedar Cr. Campgrounds	Walter Hitchcock, Glennville (1957)	Tactite along marble and quartz diorite contact trending N. 30° W., dipping steeply west. Tactite is limited to narrow lenticular zones not over 20 feet wide along the contact zone. Contact is traceable to the northwest to the Wood-Owl mine and to the southeast to Wood-No. 7 claim.	Development consists of several irregularly spaced shallow open cuts. The property has yielded between 100 and 150 tons of ore containing an estimated one percent WO_3. (Tucker, Sampson 43:63; Tucker, Sampson, Oakeshott 49:273t).
600	Magnolia (Bechtle) mine	Sec. 2, T26S, R37E, MDM, southwest side Indian Wells Cyn., 9½ miles northwest of Inyokern	Ralph Siebert, William Siebert and sons, 4216 Glenalbyn Dr., Los Angeles 65 (1957)	Scheelite-bearing tactite body in limestone, and gold-bearing quartz veins in granitic rocks. Tactite composed of clinozoisite, garnet quartz, calcite, albite, and scheelite; in lenses 1 to 1½ feet wide in limestone layer nearly 3,000 feet long.	Nine unpatented lode claims. Scheelite deposits developed by drift adits a few tens of feet long in limestone on east flank of Magnolia Peak. Development on gold-bearing vein undetermined. Gold ore containing 2/3 oz. gold per ton mined 1938-1939, some scheelite mined in 1952. Probably earlier production of gold ore. Idle. See also Nadeau under gold.
601	Major (Sweet Marie, June Ione, Rand Group) mine	Center, Sec. 19, T25S, R32E, MDM, Greenhorn Mts., ¼ mile southeast of Cedar Cr. campgrounds, on Slickrock Cr.	Brooke Woods, Glennville (1957)	Scheelite in tactite at contact zone between quartz diorite on the west and metamorphic roof pendant on the east.	See text. (Hess 22:265-266; Partridge 41:302-303; Jenkins 42:325t; Tucker, Sampson, Oakeshott 49:274t).
602	Martha prospect	SW¼ sec. 11, T30S, R40E, MDM, Stringer dist., 2¼ miles south of Randsburg	Samuel I. Jaffee, John K. Darling, addresses undetermined (1957)	One stringer in schist exposed for about 800 feet along surface. Stringer is in footwall of fault that strikes approximately N. 70° E. and dips steeply to the north.	Formerly Eclipse. Developed by several steeply-inclined shafts mostly less than 50 feet deep and an almost continuous trench along the surface. Production undetermined. Long idle.
603	Mary Etta Lowe prospect	NW¼ sec. 20, T28S, R34E, MDM, Piute Mts., 11 miles southeast of Bodfish	J. E. Moreland, Bodfish (1958)	Scheelite-bearing tactite body in small isolated pendant of metamorphic rocks a few hundred feet east of a major pendant. Tactite zone is 6 feet in average width and a few tens of feet long.	A prospect developed by an open cut about 15 feet deep. May be part of the property listed herein as the Moreland property, a few hundred feet to the southwest.
	Mayflower mine				See Minnehaha mine in text.

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Medlothian mine				See Midlothian mine under manganese
	Meeke mine			Scheelite in tactite.	See text under tin (Wiese 50:46).
	Merced mine				See under gold.
604	Miller prospect	Secs. 11, 12, T32S, R35E, MDM, in southern Sierra Nevada, 8 miles north of Mojave (1958)	Henry I. Miller, Jr., P.O. Box 737, Mojave (1959)	Scheelite in tactite in small roof pendants. Some limestone in pendants.	A prospect under development in 1955. No known production.
605	Mineralite-Azurite group	Center of N½ sec. 21, T27S, R35E, MDM, 7 miles south-southeast of Weldon, on south-east side of Rocky Point	Wade J. Gessell, Weldon (1957)	Scheelite-bearing tactite in quartz monzonite. Tactite occurs as layers in two pendants of biotite-quartz-feldspar schist. Two principal layers of tactite strike N. 30° W., dip 45°-60° SW. and average about 2 feet in width. They are discontinuously exposed in cross-cuts for 50 feet along strike and about 15 feet deep. Pegmatite dikes cross the tactite layers at approximately right angles. Layers are locally offset a few feet along cross faults. Pendants, poorly exposed, are probably few hundred feet in maximum length. Tactite contains irregularly disseminated scheelite grains as much as 1/8 inch long; locally stained green with copper oxides derived from tiny grains of chalcopyrite. Principal minerals are dark green epidote, dark reddish-brown garnet, greenish-black hornblende, and clear quartz.	Seven claims. Developed by open cuts and trenches along scheelite-bearing zones in two areas 400 feet apart. Probably no production. One man does part-time development work.
606	Minnehaha mine	NE¼ sec. 1, T31S, R33E, MDM, Loraine dist., 4 miles southeast of Loraine, about 1 mile northeast of Nellie's Nipple and ½ mile south of Indian Cr.	George Ramey, Caliente (1958)	Free gold and scheelite in quartz vein.	See text.
	Minnehaha mine				See under gold. (Jenkins 42:331t).
	Mintern prospect	Reported in sec. 24, T25S, R33E, MDM, southeast of (new) Kernville and north of Cyrus Cyn. (1942); not confirmed, 1958	Undetermined, 1958; C. C. Mintern, C. G. Pasley, Glennville (1942)	Scheelite in tactite along contact between limestone and granitic rock. Zone strikes NW., is 25 feet wide and 75 feet long. Also in quartz-feldspar dike which strikes east, dips 40° S., and is 6 to 8 feet wide.	Uncorrelated old name. Probably long abandoned prospect. Developed by shallow open cuts. (Jenkins 42:326t Tucker, Sampson 41:576; Tucker, Sampson, Oakeshott 49:274t).
	Miranda mine				See Grandad mine in text. (Jenkins 42:327t; Partridge 41:303; Tucker, Sampson 40b:332-333; Tucker, Sampson, Oakeshott 49:274t).
	Monarch Rand group				See under gold. (Averill 46:260; Brown 16:505; Jenkins 42:330t; Tucker, Sampson 41:476-577; Tucker, Sampson, Oakeshott 49:274t).
	Monarch Tungsten Gold Mining Co. mine				See Monarch Rand group under gold. (Brown 16:505,522t; Partridge 41:288).
	Monolith Cement Co. property			Scheelite in tactite.	An undisclosed amount of scheelite concentrates was produced from tactite associated with limestone in 1955. See under limestone.
607	Moreland property	NW¼ sec. 20, T28S, R34E, MDM, Piute Mts., 11 miles southeast of Bodfish	J. E. Moreland, Bodfish (1958)	Scheelite in tactite bodies along bedding planes of metamorphic rocks which strike N. 50° W. and dip 65° NE. Scheelite occurs as disseminated grains in three layers ½ to 1½ inches wide in an 8-inch-wide layer of tactite, 15 feet long and about 15 feet in depth in mine shaft. Also exposed in trenches 150 feet northwest of mine shaft. Tactite in mine shaft probably averages about 3 percent of WO_3.	Developed by a 35-foot shaft inclined 65° NE. at southeast end of tactite zone; 10-foot drift to SE. at bottom of shaft. Also 3 bulldozed trenches and open-pit excavations along tactite zone 15° northwest of shaft. Deepest open cut is 20 feet. Probably some production of scheelite in mid-1950's. Idle in 1958.

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
608	Mountain View prospect	NW¼SE¼ sec. 26, T28S, R32E, MDM, near crest of Red Mt., 5 miles south of Havilah Fire Sta.	George Ramey and H. D. Hicks, Bodfish (1949)	Scheelite in tactite zones which occur along contact between pre-Cretaceous silicated limestone and Mesozoic quartz diorite. Zones are 8 to 12 feet wide and a few tens of feet long. They strike N. 20° W. and dip about 70° NE. Scheelite is irregularly disseminated as coarse to fine crystals.	Undetermined production in 1940-1941. Developed by a 40-foot drift adit and an open cut 30 feet long and 10 feet deep. Idle since 1941. (Jenkins 42:328t; Tucker, Sampson 41:577; Tucker, Sampson, Oakeshott 49:274t).
609	Naja (Hobby, Naja Scheelite) mine	Central east side sec. 36, T28S, R33E, MDM, Piute Mts. area, 3 miles west of Claraville, on westerly slope ¼ mile north of easternmost part of Piute Pk.	Alta Minerals, a partnership, including Iven B. Hobson, 5324 Manila Ave., Oakland, and Oakley Horne, P.O. Box 1035, Isabella, owns 4 unpatented claims (1955)	Tactite outcrop 100 yds. long, 30 to 40 feet wide, trends N. 30° W., dips 60° NE. at contact between granitic rock and schistose metasedimentary rocks in roof pendant. Scheelite occurs in quartz veinlets cutting tactite, and in disseminated crystals as much as ½ inch in diameter, with molybdenite, garnet, diopside, epidote, pyrite, and quartz. Ore averages 0.5 percent WO_3 in most of deposit, but mill ore selected in 1955 averaged 0.75 percent WO_3.	Ten tons of ore containing 1.6 percent WO_3 mined from ore shoot 50 feet long, 3 to 6 feet wide from 20-foot shaft about 1942. By 1955, that shaft was filled, and new 60-foot crosscut adit driven northeast across tactite, with 100-foot drift N. 45° W. along oreshoot. Pocket, 9 to 12 feet long and 1 to 2 feet wide, yielded ore containing 30 percent WO_3 valued at $23,000 in 1950. Several tons of 30-percent WO_3 concentrate produced at Alto Minerals mill, north of Landers Meadow, 1¼ miles northeast of Claraville, in 1955. Idle 1958. (Jenkins 42:329t; Tucker, Sampson 43:64; Tucker, Sampson, Oakeshott 49:274t).
	Naja Scheelite mine				See Naja mine. (Jenkins 42:329t; Tucker, Sampson 43:64).
610	Nichol Peak prospect	S½ sec. 14, T27S, R34E, MDM, 6 miles south of Weldon, in drainage area of Dry Meadow Cr., Piute Mts.	S. W. Baker, Mrs. W. H. Fieldson, Bill Sinn, Emma H. Rahan, one of whom resides at 1583 Sheraton Rd., San Bernardino (1957)	Scheelite in two layers of garnet-epidote-calcite tactite about 10 feet apart. Tactite layers are vertical, strike N. 40° E., and are moderately iron-stained. Rough-surfaced outcrops of similar material are exposed in small knob at crest of ridge 300 feet to the southwest. Layers are adjacent to a vertical contact of quartz monzonite 8 feet to the southeast. Most common rocks in pendant of metamorphic rocks are schistose fine-grained rocks and limestone. Scheelite grains are sparsely disseminated in parts of the tactite.	Twelve claims located August, 1956. Previous name undetermined. Principal development work is on Nichol Peak No.5 and was done before 1956 location. Consists of open cut S. 40° W. into side of steep slope and which is 25 feet long, 25 feet deep, and 6 feet wide. Ten feet to southeast is 10 foot by 10 foot open cut. Probably no production. Scheelite-content of tactite undetermined.
611	No-See-Um prospect	NW¼ sec. 34, T28S, R32E, MDM, west side of Red Mt., 5 miles south of Havilah Fire Sta.	Wm. Triall, P.O. Box 66, Caliente (1954)	Traces of scheelite along fault zone in schist.	Four undeveloped claims. Production undetermined. Idle.
	O. Niell shaft				See West End field.
612	Onolite prospect	SE¼ sec. 8, T27S, R35E, MDM (proj.), 6½ miles south-southeast of Weldon, half a mile north of Rocky Pt.	Allan Knight, Calvin Knight, Penney Caldwell, addresses undetermined (1957)	Scheelite occurs in layers of garnet-epidote tactite in pendant of metamorphosed calc-silicate hornfels in quartz monzonite. Pendant is about 120 feet wide (E.-W.) and 350 feet long (N.-S.). Development work confined to central and eastern part of pendant in scheelite-bearing layers of tactite which dip 60° W. and strike N.	Ten claims. Principal work on Onolite No. 1 and consists of two trenches about 30 feet long, 4 to 6 feet deep and 60 feet apart. Also two pits from 3 to 7 feet deep. Probably no production. Some intermittent work in progress in 1957.
	Ophir-Zuck group				See Tungsten Chief mine in text. (Partridge 41:304; Tucker 21:316).
613	Oracle prospect	SE¼ sec. 34, T30S, R32E, MDM, in Devil Cyn., 6 miles east-southeast of Caliente	Undetermined, 1954		Prospect in Kernville schist. Long idle.
	Orrell group				See Donlevy mine (Jenkins 42:329t; Tucker, Sampson 43:62; Tucker, Sampson, Oakeshott 49:240-241, 272t).
614	Owl (Wood-Owl) mine	E½ sec. 17, T25S, R32E, MDM, Greenhorn Mts., 1¼ miles northeast of Greenhorn Summit on the northeast branch of the head of Cedar Cr.	Brooke Woods, Glennville (1957); leased to National Tungsten Corp., 6758 Hollywood Blvd, Los Angeles 28 (1956)	Lenticular tactite bodies along a contact between a metamorphic roof pendant and quartz diorite.	See text. (Jenkins 42:325t; Tucker, Sampson 41:577; Tucker, Sampson, Oakeshott 49:274t).
615	Pala Ranch mine	NW¼SW¼ sec. 25, T25S, R32E, MDM, Greenhorn tungsten dist., 2½ miles west of Wofford Heights, ½ mile southwest of Cane Pk.	Pala Ranches, Mr. Earl Pascoe, Kernville (1958); Leased to Rene Engel and Associates, Wofford Heights	Scheelite in tactite..	See text.

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Pappy mine				See El Diablo mine.
	Patsy claims				Name of placer claims to which part of the production of placer scheelite from the Stringer district has been credited. See Stringer district placer mines in text.
	Pearl Wedge mine				See under gold.
	Pine Tree mine				See under gold. (Jenkins 42:332t; Tucker, Sampson 41:577-578; Tucker, Sampson, Oakeshott 49:274t).
	Placer Gold Co. property				See under gold. (Boalich, Castello 18:13t; Brown 16:507; Partridge 41:289).
	Plasse	Reported in sec. 12, T27S, R34E, MDM, Piute Mts., (1942); not confirmed, 1957	Undetermined, 1957; A. H. Plasse, address undetermined (1942)	Scheelite in tactite.	Uncorrelated name; may be property listed herein under different name. (Jenkins 42:328t).
	Play Boy	Reported in sec. 1, T26S, R33E, MDM, about 4 miles southeast of (new) Kernville (1945)	Undetermined, 1958; Don Hennings address undetermined (1949)		Uncorrelated old name. Probably long abandoned prospect. (Jenkins 42:327t; Tucker 49:274t).
	Power Line mine				See text under High Power mine. (Jenkins 42:325; Tucker, Sampson, Oakeshott 49:273t).
616	Prosperity prospect	NW¼SW¼ sec. 26, T27S, R32E, MDM, Clear Cr. dist., 2 miles north of Havilah on northeast tip of ridge extending north from Rankin Pk.	Gail Lea Hamilton, 6143-3/4 GlenHolly, Hollywood (1957)	Scheelite-bearing quartz vein, which ranges in width from 6 feet to 14 feet, strikes N. 10 E. and dips 60°-80° E. in quartz diorite. Metamorphic rocks found in dump of crosscut suggest that the vein is near a contact. Probably contains minor amounts of gold. Vein exposed along strike for 150 feet and to 40-foot depth in open cut situated 100 feet above crosscut.	Development consists of a crosscut of undetermined length and a drift driven S. 10 E. from the north end of the hill. The drift probably is connected to the crosscut as indicated by circulating air. (Jenkins 42:328t; Tucker, Sampson 40b:333, Tucker, Sampson, Oakeshott 49:274t).
	Pyarin group (Indian Wells)				See F O B mine. (Tucker, Sampson, Oakeshott 49:274t).
	Pyavin group (Indian Wells)				See F O B mine. (Jenkins 42:327t).
	Radcliffe (Ratcliffe) mine	NE¼ sec. 12, T30S, R40E, MDM, Stringer dist., 2¼ miles southeast of Randsburg	Undetermined, 1957	Scheelite in fault zones 2 inches to 2½ feet wide in schist. Veins strike east, dip generally south. Principal ore shoots at intersections of fault zones and porphyritic dike which strikes N. 50° W., dips 60° NE.	Vertical shaft on south half of Jersey Lily claim (see Jersey Lily group) (Hulin, 1925, pl. 28). Shaft is 150 feet deep with few hundred feet of drifts on levels at 65, 100, and 150 foot depths. Radcliffe group may have formerly included mining claims to west. Production undetermined. Idle.
	Rainbow prospect				See under gold.
	Ramey	Reported in Loraine dist. (1918)	Undetermined, 1958; J. E. and G. L. Ramey, Caliente (1918)		Uncorrelated old name. Probably now the Minnehaha mine. (Boalich, Castello 18:13t).
	Rand mine				See Cadillac mine.
	Rand group				See Major mine in text. (Hess 22:265-266; Partridge 41:302-303; Jenkins 46:325t; Tucker, Sampson, Oakeshott 49:274t).
	Rand Gold Dredging Assoc. property				See under gold. (Tucker, Sampson, Oakeshott 49:231).
	Ratcliffe mine				See Radcliffe mine and Jersey Lily group. (Hulin 25:144; Tucker 21:316; 29:63).
	Raymond mine				See Cyrus Canyon mine.
	Red Bird mine				See under gold.
617	Rimrock mine	NE¼SE¼ sec. 2, T25S, R29E, MDM, 2 miles south by southeast of Bald Mt., 3 miles southeast of White R.	John Moore, Woody (1956)	Scheelite in tactite.	See text.

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Royal Bohee mine				Probably the Tungsten Mountain mine. Also gold. (Boalich, Castello 18:13t; Jenkins 42:331t; Partridge 41:289-290; Tucker 21:316; 29:63; Tucker, Sampson, Oakeshott 49:275t).
	Royal Bohn mine				Probably the Tungsten Mountain mine. Also gold. (Brown 16:509, 522; Partridge 41:281, 290).
	Santa Ana mine				See under gold (Boalich, Castello 18: 13t; Brown 16:522; Partridge 41:290).
	Sidewinder prospect	Butterbread Cyn. area		Scheelite stringers in schist.	See under gold.
	Sidney Peak mine				See Sidney mine under gold. (Hulin 25: 72, 81).
	Sierra Tungsten group				Uncorrelated old name. Probably formerly comprised of the Ideal group. (Herschel Kelso, King, Owl properties). Jenkins 42:325t; Tucker, Sampson, Oakeshott 49:275t).
618	Silver Strand prospect	NE¼ sec. 9, T25S, R32E, MDM, Greenhorn Mts. on Calf Cr. about 2½ miles northeast of Greenhorn Summit	Mr. Brookner, Glennville (1957)	Weak narrow tactite zone adjacent to an apophyses contact in a limestone roof pendant. Anomylous radioactivity probably due to presence of radon gas or radium. (Walker, Lovering, Stephens 1956, p. 31).	Developed by two small open cuts 50 feet long, 25 feet wide, 30 feet high and two adits driven N. 10 W., N. 55 W., through marble towards tactite-contact zone. The adits are 100 feet and 150 feet long. No recorded production. Idle. (Walker, Lovering, Stephens 56: 11t, 31).
619	Snow White prospect	SE¼NE¼ sec. 34, T25S, R37E, MDM, southwest side of Indian Wells Cyn., 10½ miles northwest of Inyokern	Bob Edwards, Inyokern (1957)	Discontinuous scheelite-bearing garnet-epidote tactite lenses in metasedimentary rocks.	Principal development is northwest-driven drift of undetermined length parallel to strike of steeply-northeast-dipping rocks. Small production reported in 1953. Idle.
620	Sonny Boy prospect	Approx. center sec. 17, T27S, R35E, MDM, 7 miles south-southeast of Weldon, on north slope of Rocky Pt., east side of Kelso Cr.	Comer P. Binford, Weldon (1957)	Several inclusions of dark tactite in quartz monzonite. Tactite bodies are locally surrounded by rind of hornblende gabbro then by quartz monzonite. Tactite bodies range in size from few feet in maximum dimension to several tens of feet. Locally contain pods and elongate lenses of garnet-epidote tactite and in some places contains moderate amount of hornblende. Chalcopyrite present in minor proportions and green copper oxide staining is locally abundant.	Seventeen claims. Principal development is on Sonny Boy No. 11 claim in an area about 100 feet long on steep north slope of Rocky Pt. Rocks have been scraped clear with bulldozer and hand trenched to expose shceelite-bearing rocks. Probably no production. Idle.
	Stanford group				See Gold Coin group under gold. (Boalich, Castello 18:14t; Jenkins 42:331t).
621	Stardust prospect	NW cor. sec. 20, T27S, R35E, MDM, 7 miles south-southeast of Weldon	John W. Nicoll, Martin L. Hess, Weldon (1957)	Scheelite in tactite.	See text.
622	Stardust (Dorris and Cuddeback property, Star Dust and Black Cat) mine	Center of west boundary of sec. 2, T27S, R34E, MDM, 4 miles south of Weldon	Undetermined, 1957	Scheelite in tactite.	See text. (Jenkins 42:328t; Tucker, Sampson 43:62; Tucker, Sampson, Oakeshott 49:275t).
	Star Dust and Black Cat				See Stardust mine in text. (Jenkins 42: 328t; Tucker, Sampson, Oakeshott 49: 275t).
623	Stringer district placer mines (includes properties of several claim holders)	Mostly in secs. 12, 13, 23, and 24, T30S, R40E, MDM, Stringer and Atolia dists., about 3 miles southeast of Randsburg	Several: Includes Super Mold Corp. of California, Lodi; Lila King Mining Co., Los Angeles; C. W. Dunton, 1145 Westminister St., Alhambra and S. E. Chipaella, 1625 N. Las Palmas Ave., Hollywood 28; and others (1957)	Scheelite in stringers in quartz monzonite and residual gold and scheelite in alluvium.	See text. Area has been source of large amount of scheelite since early 1900's from numerous mining activities. Adjoins lode and placer deposits of Atolia dist. in San Bernardino County. For description of dist. see Hulin, 1925, p. 70-79, 125-128; Lemmon and Dorr, 1940, p. 205-225; and Wright, et al, 1953, p. 140-146.
624	Summit Lime Co., property	Probably secs. 34, 35, T12N, R15W, SBM	Summit Lime Co., Elliott S. Wyman, pres., 2130 Workham Way, Sacramento (1958)	Scheelite in quartz vein in granodiorite. Vein strikes N. 60° W., dips 45° SW., is from 6 to 12 inches wide, and at least 15 feet long. Principal pod of ore (about 900 lbs.) was found about 1940 at intersection of vein and gently-dipping (quartz ?) stringers.	An important source of lime. See under limestone. Locality of vein not specified 1941; not determined, 1958. Minor production 1940-1943. (Jenkins 42: 332t; Tucker, Sampson 41:578).

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Sunset group				See Hawk mine. (Jenkins 42:331t; Partridge 41:313; Tucker 21:316; 29:63; Tucker, Sampson, Oakeshott 49:275t).
	Sun shaft				See West End field.
	Sunshine mine	Stringer dist.			See text under gold. (Boalich, Castello 18:12t, 13t; Brown 16:522; Hulin 25:84; Partridge 41:290).
625	Susie Q prospect	NE¼ sec. 9, T25S, R32E, MDM, Greenhorn Mts., 2½ miles northeast of Greenhorn Summit	Al Wilburn, 406 3d St., Taft, Fred Roope, 1100 Tangerine St., Bakersfield (1957)	Scheelite in garnet-epidote tactite.	See text.
	Sweet Marie mine				See Major mine in text. (Hess 22:265-266; Partridge 41:302-303; Jenkins 42:325t; Tucker, Sampson, Oakeshott 49:274t).
	Syrus Canyon mine				See Cyrus Canyon mine (Jenkins 42:326t; Tucker, Sampson 40b:333; Tucker, Sampson, Oakeshott 49:275t).
	Ten O'Clock	Reported in T26S, R34E, MDM (1918); not confirmed, 1957	Undetermined, 1958		Uncorrelated old name; may be property listed herein under different name. (Boalich, Castello 18:13t).
	Texas Star No. 1, No. 2 prospect				See Corporal BEK prospect.
626	Tripoli prospect	E½SW¼ sec. 30, T27S, R33E, MDM, Piute Mts., northeast flank of Bald Eagle Pk., 3¼ miles south-southeast of Bodfish	James Seliger, address undetermined (1958)	Vertical fracture zone which strikes N. 20° E. on west side of pendant of metamorphic rocks. Scheelite erratically distributed in tactite layer 1 to 5 feet wide in fracture zone.	A prospect developed by open cut about 40 feet long in fracture zone. Probably no production.
627	Trixie (Herschel Kelso (?)) prospect	NW¼ sec. 17, T25S, R32E, MDM, Greenhorn Mts. 2 air miles north-northwest of Greenhorn Summit, 600 feet west of the Summit Rd., northeast head of Cedar Cr.	Homer Cantrell, Glennville (1957)	Scheelite in tactite along contact between a small limestone roof pendant and quartz diorite. Strikes about N. 15 E., dips vertically, and is 25 feet wide. Typical tactite composed of iron-stained, friable, coarse-grained epidote, garnet, quartz, and calcite. Said to have contained as much as 2 percent WO_3. (Hess 1922, p. 265).	Originally located as a gold prospect prior to World War I. Development is limited to open cuts and shallow untimbered shafts. Inactive. Produced about 100 tons of ore containing about 1 percent WO_3. (Hess 22:264-265; Partridge 41:302; Tucker, Sampson, Oakeshott 49:273t).
	Tungsten Big Lode	Reported in secs. 11, 14, T27S, R34E, MDM, Piute Mts. (1941); not confirmed, 1957	Undetermined, 1957; H. W. Daley, George Munson, Isabella (1941)		Uncorrelated name. May be same as Nichol Peak mine. (Jenkins 42:328t; Tucker, Sampson 41:578; Tucker, Sampson, Oakeshott 49:275t).
	Tungsten Chief (Ophir Zuck, Wall Street) mine	S½ sec. 27, T28S, R32E, MDM, west side of Red Mt., about 2 miles north of Walker Basin	Mike Gusty, Isabella (1958)	Scheelite in tactite.	See text. Includes First Landing, Good Hope, and Rocky Point mines. (Dibblee 53:54-55; Jenkins 42:329t, Partridge 41:304; Tucker 21:316; Tucker, Sampson 41:578-579; Tucker, Sampson, Oakeshott 49:275t).
	Tungsten Development Co. property				See West End field.
628	Tungsten Hill group (includes claims owned separately by three people)	Center, E½ sec. 3, T28S, R32E, MDM, Clear Creek dist., 3/4 mile north of Havilah on lower east flank of O'Brien Hill	Gail Lea Hamilton, 6143-3/4 GlenHolly, Hollywood (One claim); (1958)	Scheelite in lens of garnet epidote tactite along contacts between quartz diorite and metamorphic rocks. Principal ore body and zone of exploration strikes N. 65° E., dips SE.	Tactite lens mined in inclined stope open at top and connected with vertical shaft about 40 feet deep. Drift extended from stope area about 75 feet N. 65° E. Probably some production. Idle.
			Helen Robertson (2 claims) (1958)	Scheelite-bearing lens in garnet-epidote-wollastonite tactite strikes N. 10° W. Metamorphic rocks in vicinity of mine are part of large pendant that extends to north and south along prominant east front of O'Brien Hill. Rocks locally contain granitic dikes and small masses of quartz diorite.	Principal ore body mined in open cut 30 feet long, 20 feet wide, and 20 feet deep at face where the ore is truncated by a fault which strikes N. 55° E., dips 75° SE. Drift about 30 feet below floor of open cut has been driven S. 10° E. an undetermined distance. Ore from open cut reported by H. V. Porter (personal communication, 1957) to have yielded about $10,000 in scheelite from ore which contained as much as 10 percent WO_3. Idle.
			Earl Johnson, Bodfish (6 claims) (1958)	Scheelite in tactite.	

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
629	Tungsten King (King Tungsten) mine	SW¼ sec. 23, T27S, R32E, MDM, Clear Cr. dist., 3 miles north of Havilah on the southeast flank of Hooper Hill	A. O. Zuck, (address undetermined) and W. R. Tillman, Garfield (1957)	2 parallel quartz veins adjacent to small metamorphic roof pendant.	See text. (Jenkins 42:328t; Partridge 41:303; Tucker 21:315, 316; Tucker 29: 62; Tucker, Sampson 40b:333; 42:328t; Tucker, Sampson, Oakeshott 49:275t).
630	Tungsten Mountain mine	SW¼ sec. 9, T30S, R40E, MDM, Rand dist., 3¼ miles southwest of Randsburg, ½ mile from crest of Rand Mts.	John Shelburn, Randsburg (1957)	Scheelite-bearing quartz veins which strike N. 65°-70° E. and dip steeply to S. in green amphibolite schist. Scheelite occurs as irregular small masses and crystals in quartz and wall rock. Veins range in width from 1 to 7 inches. Scheelite penetrates wall rock a maximum of several inches. Stringers occur in zone about half a mile long. Tungsten content of stringers and wall rock in places is as much as 6 percent WO_3, but mostly 1 percent or less.	Two claims. Probably same as Royal Bohee (Royal Bohn) mine from which a few tens of ounces of gold was produced before 1918. Several east-driven drift adits from 50 to 240 feet long and 3 shallow vertical shafts. Tungsten production undetermined. Idle.
	Tungsten Queen mine				See El Diablo mine. (Tucker, Sampson 41:579).
631	Tungsten "V" prospect	SW¼ sec. 26, T27S, R32E, MDM, Clear Cr. dist., 1½ miles north of Havilah, northeast flank of Rankin Pk.	W. W. Hilton, C. L. Seager (1957), address undetermined	Erratically-distributed scheelite in north-trending band of siliceous brown hornfels adjacent to a 10-foot wide dike of granitic rock, within a larger mass of metamorphic rock.	Development by an opencut approximately 100 feet long, 30 feet high, and 30 feet wide. Idle.
632	Tungstore No. 2 mine	SE¼ sec. 2, T25S, R29E, MDM, White River dist., 3 miles southeast of White R., 2½ miles southeast of Bald Mt.	John Moore Ranch, Woody (1959)	Scheelite in tactite.	See text. (Jenkins 42:325t; Tucker, Sampson, Oakeshott 49:275t).
633	Unip (Embree) mine	N½SW¼ sec. 23, T27S, R33E, MDM, on west side of Erskine Cr., ¼ mile west of Flood Ranch house, 5½ miles southeast of Bodfish	Undetermined, 1958	Scattered small grains of scheelite in folia and cross-fractures mainly in limestone but also in argillite and hornfels of Carboniferous (?) age.	See text.
634	U-See-Um group	SE¼NW¼ sec. 34, T28S, R32E, MDM, southwest slope Red Mt.	Wm. Triall, P.O. Box 66, Caliente (1954)	Contact zone between quartz diorite and schist.	Developed by 15-foot vertical shaft. No ore developed. Idle.
635	Victory prospect	SE¼ sec. 16, T25S, R32E, MDM, Greenhorn Mts., 1½ air miles northeast of Greenhorn Summit on west bank of Calf Cr.	Melvin M. Ford, P.O. Box 293, Inyokern and Oscar F. Lipnitz, Glennville (1957)	Scheelite in tactite zone adjacent to contact of metamorphic roof pendant and granodiorite. The contact trends N., is vertical, 10-15 feet wide, and contains scheelite grains 1 to 3 mm. in diameter with coarse-grained garnet and epidote. Owners report 7-foot zone averaging 1.5 percent WO_3.	Developed by 36-foot shaft with 25-foot drift to south at bottom, and by shallow cuts along a strike-distance of several hundred feet. Yielded 20 to 30 tons of ore containing about 2 percent WO_3.
	Victory claims				Name of placer claims to which part of the production of placer scheelite from the Stringer district has been credited. See Stringer District Placer mines in text.
	Wall Street mine				See Rocky Point mine. (Partridge 41: 304; Tucker 21:316).
	Wattal group	Reported in Loraine dist. (1918); not confirmed, 1958	Undetermined, 1958; J. C. Kinsman and J. A. Kelly, Goffs (1918)	Also molybdenum.	Uncorrelated old name. May be at head of Devils Cyn., 6 miles east of Caliente (Boalich, Castello 18:13t, 23t).
636	West End field	SE¼ sec. 24, T30S, R40E, MDM, Atolia mining dist., 4½ miles south-southeast of Randsburg	Atolia Mining Co., 1022 Crocker Bldg., San Francisco; leased to Surcease Mining Co., P.O. Box 786, Sacramento (1958)	Area west of extensive system of scheelite-bearing quartz-carbonate veins occupying faults in quartz monzonite in the Atolia district. The nearest veins to the West End field are those in the Union and Star shafts and in the Gardner shaft. They strike approximately west, dip moderately north, and are exposed about 1,500 feet east of the O'Neill shafts.	Several shafts into bedrock and prospect pits in placer material were developed about 1916 in search for tungsten west of the known deposits of the Atolia district. Principal shafts were the O'Neill shafts and the Sun shaft sunk by Tungsten Development Co. The O'Neill shafts are vertical shafts about 60 feet apart and 2,500 feet west of the Union No. 9 shaft in San Bernardino County. Shafts extend 50 feet to base of alluvium, 20 feet to an intermediate level, then to a lower level at an undetermined depth. Lower level extends 195 feet N. and 110 feet SE. but no scheelite found. Sun shaft is 1,250 feet south of O'Neill shafts. It was sunk 127 feet in alluvium, then 48 feet in bedrock. At bottom of shaft (174.6 feet) a crosscut was driven 180

TUNGSTEN, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
636	West End field (continued)				feet N. and an undetermined distance S. but no scheelite was found. Subsequent exploration in Gardner shaft several tens of feet northwest of O'Neill shafts resulted in development of a tungsten vein in this field. (Lemmon, Dorr 40: 245).
	Why Not prospect				See Lucky Hit deposit in text. (Hess, Larsen 22:264; Jenkins 42:325t; Partridge 41:305; Tucker, Sampson, Oakeshott 49:272t).
637	Wildcat prospect	Center sec. 16, T25S, R32E, 1¼ miles northeast of Greenhorn Summit, between Calf & Cow Creeks	Melvin M. Ford, P.O. Box 293, Inyokern, and Oscar F. Lipnitz, Glennville (1954)	Scheelite in tactite along contact zone between granodiorite and limestone.	Development limited to a 40-foot shaft and 80 feet of drifts. Yielded 50 to 100 tons of ore averaging about 1 percent WO_3 in 1942, 1943. May have been part of Gribble group (see Good Enough and Lucky Strike mines). (Tucker, Sampson 43:63; Tucker, Sampson, Oakeshott 49: 273t).
638	Williams Ranch deposit	Reported in sec. 16, T29S, R33E, MDM, south slope of Piute Mts. at east end of Walker Basin (1941); not confirmed, 1958	Undetermined, 1958; Nick Williams, Caliente (1941)	Two outcrops of tactite which strike N. to N. 30° W. are from 20 to 30 feet thick and 200 feet long. The tactite, composed of quartz, garnet, and epidote, occurs with schist as roof pendants in granite. Scheelite occurs in tactite and ore containing from 0.5 to 1.5 percent of WO_3 is reported to have been extracted (Tucker and Sampson, 1941, p. 580).	Scheelite occurrences are in remnants of pendant that extends along northeast side of Walker Basin to Red Mt. Prospect shafts and shallow trenches were excavated before 1941. May have yielded small amount of tungsten concentrates. Idle. (Jenkins 42:329t; Tucker, Sampson 41:579-580; Tucker, Sampson, Oakeshott 49:276t).
	Winnie mine				See under gold. (Boalich, Castello 18: 13t; Brown 16:522; Hulin 25:72, 84; Partridge 41:291; Tucker 29:52).
639	Wood No. 7 prospect	S½ sec. 17, T25S, R32E, MDM, one mile northwest of Greenhorn Summit, just northwest of Glennville-Wofford Hts. Rd.	Brooke Woods, Glennville (1958)	Scheelite in tactite.	Shallow surface cuts. Idle.
	Wood-Owl mine				See Owl mine in text.
640	Undetermined	SW¼ sec. 1, T25S, R29E, MDM, 3 miles SE. of White R.	Undetermined, 1957		Abandoned prospect. Surface cuts.
641	Undetermined	SE¼SW¼ sec. 2, T25S, R29E, MDM 3 miles southeast of White R.	Undetermined, 1957		Undeveloped prospect.

The west ore body apparently was mined out by about 1940 in an open pit 20 feet wide, 35 feet long, and with a west face 25 feet high. The eastern ore body, worked intermittently between 1940 and 1955, was developed by a two-compartment shaft which was 97 feet deep in mid-1955. The water level at that time was at about 90 feet. Drifts were driven 70 feet southeast and 5 feet northwest on the 35-foot level and 75 feet southeast and 25 feet northwest on the 80-foot level. Southeast of the shaft, open stopes 15 to 25 feet long were mined from the 80-foot level to the surface. Crosscuts 35 feet northeast and 25 feet northwest on the 80-foot level contain little or no scheelite.

A mill about a quarter of a mile northwest of the mine had a daily capacity of 100 tons in mid-1955. It consisted of a jaw crusher, screens, three dewatering cones, and two concentrating tables. Two shifts of miners, four to five men each, operated the mine in mid-1955; one man operated the mill.

Uranium

Following the announcement of a shipment of a rail carload of uranium ore from the Miracle mine in Kern River Canyon in July 1954, the first carload shipped from a California source, an intensive and sometimes frantic search for uranium was begun throughout Kern County as well as most of the rest of southern California. By November 1957, a total of 400 tons of uranium ore, ranging in grade from 0.16 to 0.62 percent of U_3O_8, had been shipped from three mines in Kern River Canyon, and a few tons of lower-grade ore had been shipped from deposits elsewhere in the county. Anomalous radioactivity was detected in many tens of localities in Kern County, but only a few of them appear to have warranted more than shallow exploration.

Most of the uranium in Kern County (fig. 111) is in (1) the foothills on the northeast side of the Temblor Range in western Kern County, (2) parts of the Kern River Çanyon within a few miles of Bodfish, (3) the

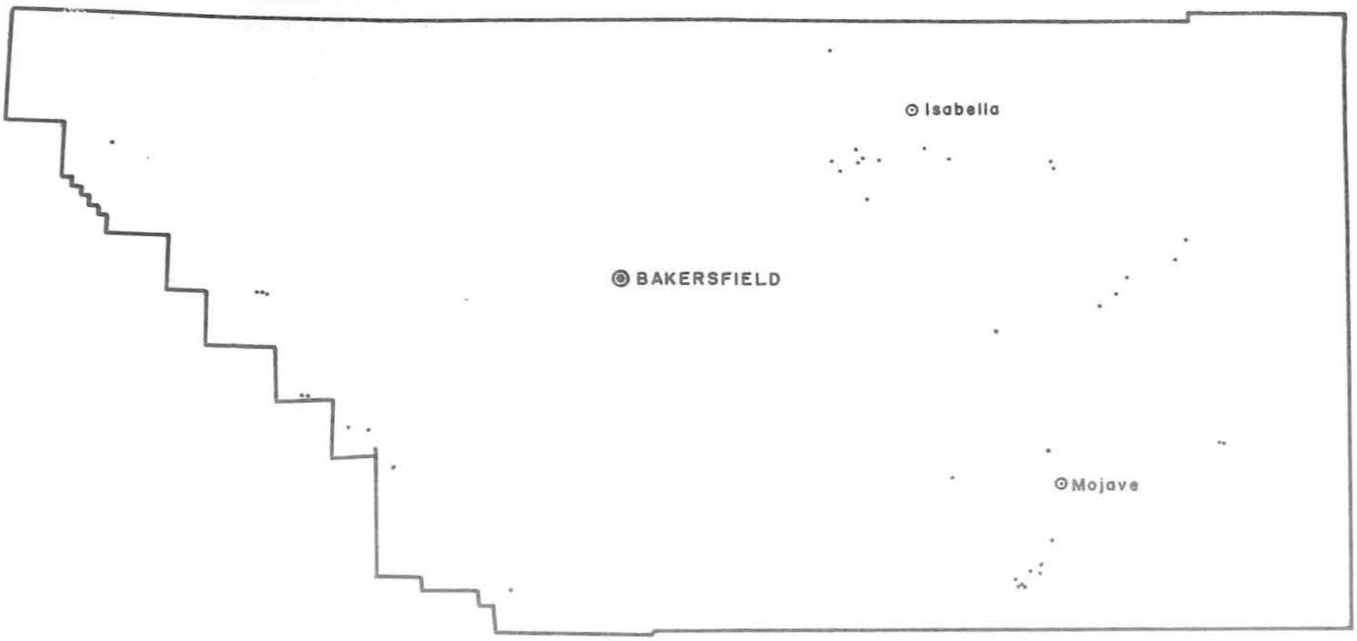


Figure 111. Distribution of uranium deposits in Kern County.

Rosamond Hills southwest of Mojave, and (4) the Jawbone Canyon-El Paso Mountains area in eastern Kern County. Other uranium deposits are widely scattered through the county.

In general, the uranium deposits in Kern County are in (1) fine-grained marine sedimentary rocks, of Miocene age, in the Temblor range; (2) Mesozoic granitic rocks of the Sierra Nevada; and (3) Tertiary volcanic rocks and Tertiary nonmarine sedimentary rocks in the southeastern part of the county. Uranium deposits are also present in pre-Cretaceous metasedimentary rocks that form roof pendants in granitic rocks of the southern Sierra Nevada. One deposit of Recent peat-like material in a bog on Pettit ranch near Kern River Canyon contains uraniferous plant debris which is absorbing uranium from water rising through a fault that underlies the bog. Uranium-bearing water has been noted in springs elsewhere in the southern Sierra Nevada.

In most deposits the precise age of the uranium mineralization was not determined. Much of it is post-Miocene as indicated by the Miocene age of marine sedimentary host rocks and the probable Miocene age of some of the volcanic host rocks. Uranium mineralization in the granitic rocks also may be post-Miocene in age.

Most of the uranium deposits in Kern County consist of secondary minerals, the most common of which are autunite ($CaO.2UO_3.P_2O_5.12H_2O$) and uranophane ($CaO.2UO_3.2SiO_2.6H_2O$). Carnotite ($K_2O.2UO_3.V_2O_5.1\text{-}3H_2O$), schrockingerite (approximately $Ca_3Na.UO_2.SO_4.F.10H_2O$), torbernite ($CuO.2UO_3.P_2O_5.12H_2O$), and tyuyamunite ($CaO.2UO_3.V_2O_5.nH_2O$) have been noted in some deposits. Uraninite and coffinite, both primary uranium minerals, have been identified in ore from the Little Sparkler mine in Kern River Canyon and uraninite has been questionably identified in ore in the Kergon and Miracle mines in the same area.

The mineralization in most of the deposits probably is controlled by faults, fractures, and shear planes. Some of the mineralization in the Temblor Range and in the Mojave Desert appears to have been guided by bedding planes in certain types of sedimentary host rocks.

Dono-han (Section 10 Anomaly) Prospect. Location N½ S½ sec. 10, T. 9 N., R. 13 W., S.B.M., half a mile northwest of Tropico Hill, and 4½ miles west-northwest of Rosamond. Ownership: Rosamond Mining Co., 617 South 5th St., Las Vegas, Nevada; Robert P. Donovan, president, P.O. Box 295, Rosamond, owns 8 unpatented claims (1958).

The Dono-han deposit was discovered in January 1954 by the U. S. Atomic Energy Commission and independently by Robert P. Donovan and Christian K. Hansen. Exploration and development of the deposit commenced in 1954 but was interrupted until 1957 pending settlement of a dispute concerning ownership of the land. The property was idle in 1959.

Mesozoic quartz monzonite, which underlies most of the low hills in the vicinity of the Dono-han prospect, is intruded by an andesite porphyry dike which averages 50 feet in width and is about 2,000 feet long (fig. 112). The dike strikes east and dips steeply south. Autunite, meta-autunite (Barrett and Magleby, 1954, p. 9), and uranophane (?) are in the andesite porphyry as coatings along weak fractures, which trend N. 75° W. and N. 30° E., and as grains disseminated in the andesite porphyry adjacent to the fractures. Very small euhedral crystals of pyrite, which are mostly altered to limonite pseudo-

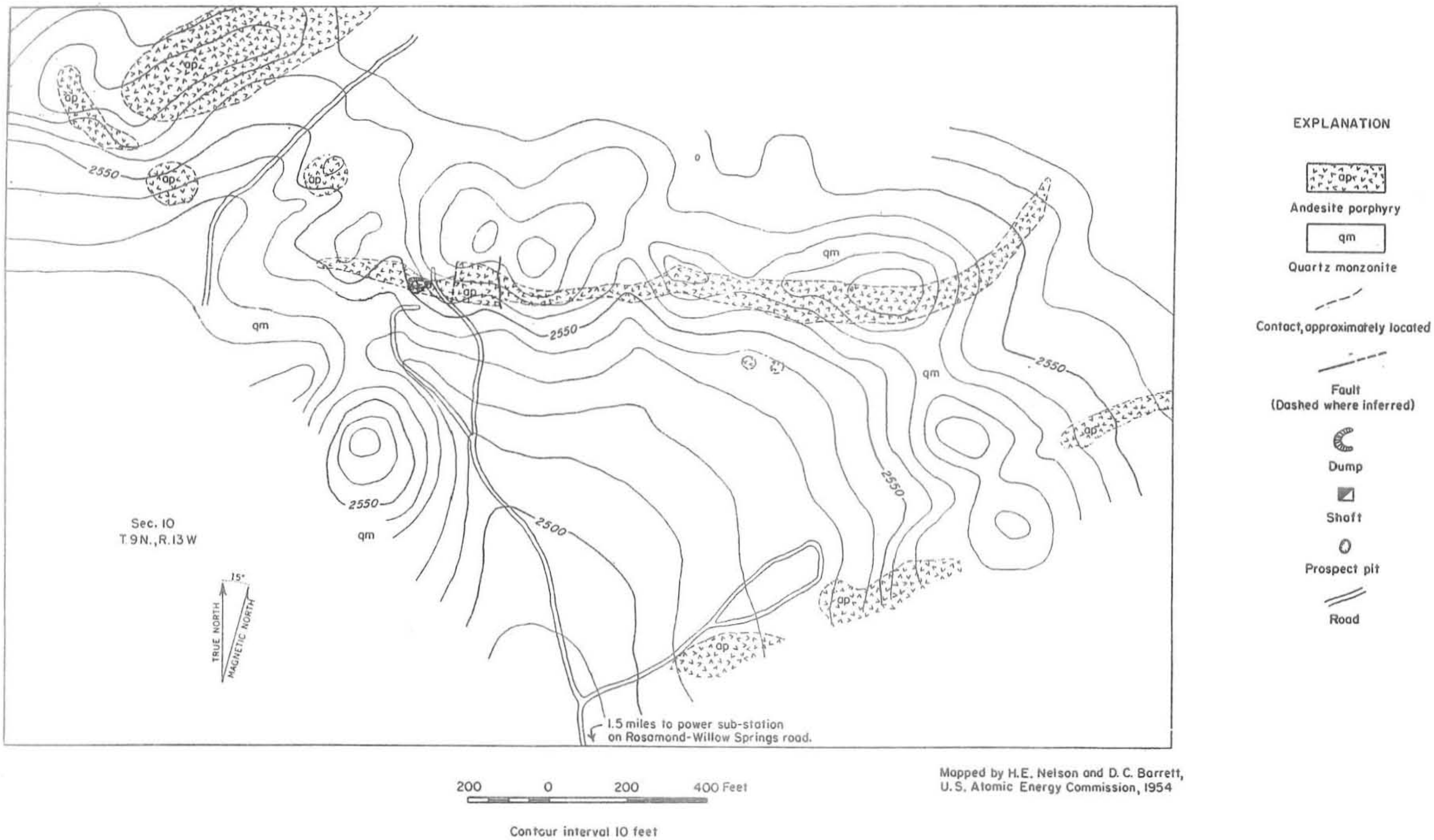


Figure 112. Geologic map of the Dono-han prospect. Uranium mineralization is along part of the dike in center.

morphs, are widely disseminated throughout the dike. The owner reports that some ore has assayed 0.51 percent U_3O_8; an early sample assayed by the U. S. Atomic Energy Commission assayed 0.41 percent U_3O_8 (Barrett and Magleby, 1954, p. 9).

In July 1958, three men were sinking a one-compartment vertical shaft which was then 53 feet deep. Other development consists of shallow trenches and a short adit driven eastward from a point about 300 feet east of the shaft. No ore had been shipped as of July 1958.

*Kergon Mine.** Location: NW¼ sec. 20, T. 27 S., R. 32 E., M.D.M., 35 miles northeast of Bakersfield, adjacent to State Highway 178, on the southeast side of Kern

* Information obtained mostly from a report by Bowes (1957, p. 5-30).

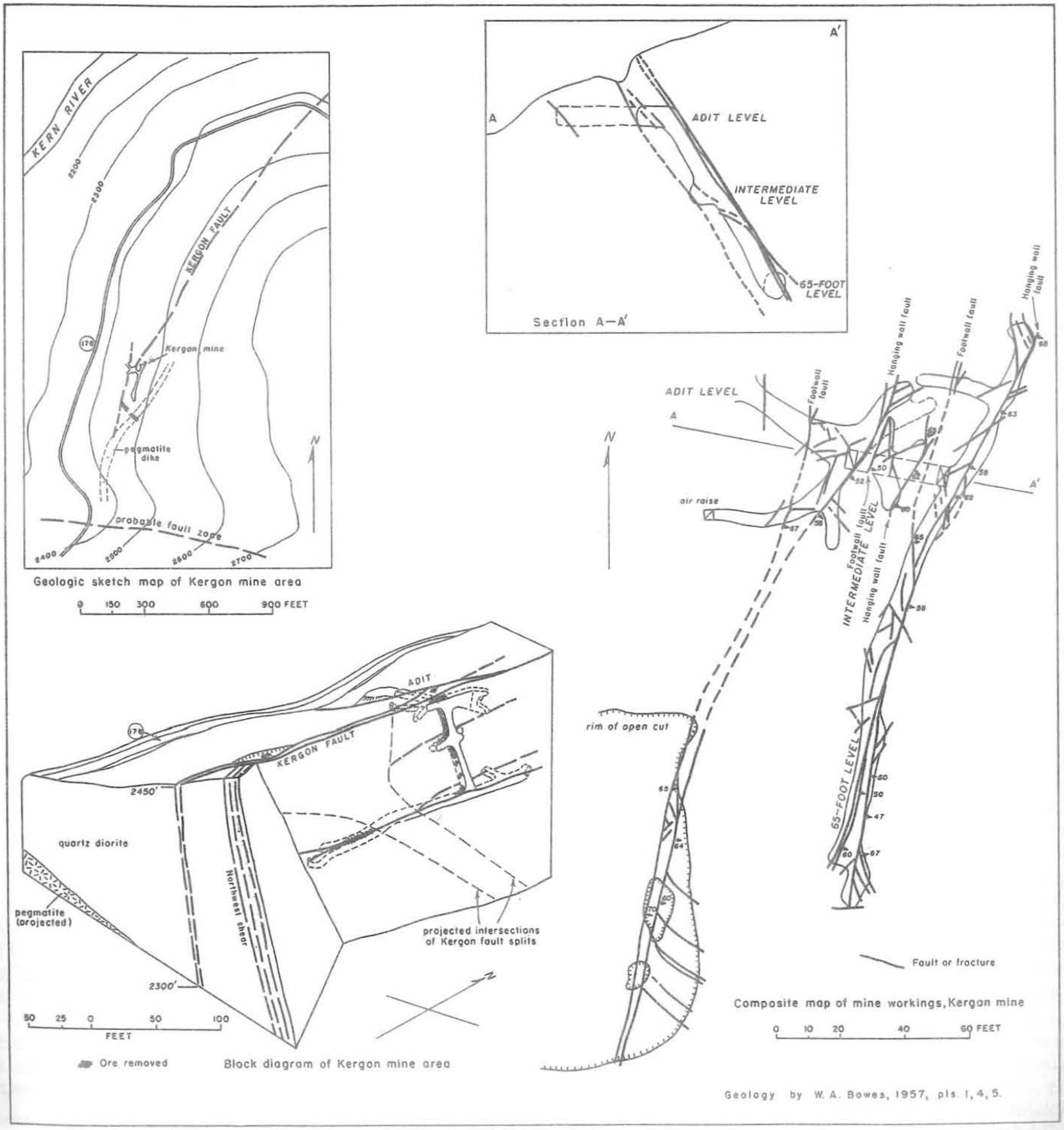


Figure 113. Maps, cross section, and block diagram of the Kergon mine.

River Canyon. Ownership: Great Lakes Oil and Chemical Co., 417 S. Hill St., Los Angeles, owns several claims (1958).

The Kergon uranium deposits were discovered in May 1954 by J. I. Kerns and W. T. Waggoner of Taft. After a brief period of development the property was sold to Great Lakes Oil and Chemical Co. Two rail carloads of uranium ore were shipped to Vitro Chemical Co., Salt Lake City, Utah, before the mine was shut down in 1956 pending settlement of lawsuits which were settled in 1958 in favor of Great Lakes Oil and Chemical Co. The first ore shipment, made October 12, 1955, consisted of 50.7 tons which averaged 0.16 percent of U_3O_8. The second shipment was made on December 20, 1955, and consisted of 50 tons which averaged 0.217 percent of U_3O_8. The mine was idle in 1958.

The Kergon mine area is underlain by Mesozoic quartz diorite transected by the Kergon fault, about 1,800 feet in observed length which strikes about N. 25° E. and dips 50°-65° SE (fig. 113). The southern part of the Kergon fault merges with a N. 5° E.-trending, 65° E.-dipping fault about 450 feet in exposed length. Both faults appear to die out in quartz diorite to the northeast and in a northeast-trending pegmatite dike about 300 feet south of the principal mine workings.

Most of the uranium mineralization appears to be confined to parts of a 200-foot segment of crushed and altered quartz diorite that lies between the two faults. The north end of this crushed zone is 10 to 15 feet wide but tapers southward to 3 to 5 feet. The Kergon fault forms the hanging wall of this zone and the other fault forms the footwall. A northwest-trending, northeast-dipping shear in the hanging-wall block joins the Kergon fault and marks the southernmost presence of observed uranium mineralization.

The northernmost and largest of the observed ore shoots is near the point of divergence of the footwall and hanging wall. It consists of uranium minerals in fractures in a 10- to 15-foot-wide zone of soft, altered quartz diorite. Small shoots and pods of ore-grade material (approximately 0.2 percent of U_3O_8) are about midway between the hanging wall and footwall at the surface, but are adjacent to the hanging wall at 100-foot depth; at this depth a lenticular mineralized body was 15 to 20 feet long. Fifty feet south on this level is an ore body nearly 30 feet long and from 6 inches to 3 feet wide, at a point that appears to be a few feet north of the downward northerly projection of the intersection of the Kergon fault and the northwest-trending shear in the hanging block. A few small pods of ore-grade material were also found at this intersection at the surface.

Autunite is the principal uranium mineral in the Kergon mine. Uranophane is associated with autunite in the lower parts of the mine and both these minerals form halos around masses of black radioactive material, probably composed partly of uraninite. The black material contains ilsemannite and jordisite, both of which are molybdenum-bearing minerals. Fluorite, barite, and cerussite are in some of the pods of black material, and pyrite has been found at one locality in the mine. Calcite in thin seams is near the footwall. The principal host material for mineralization is clayey fault gouge. Secondary iron oxides are found throughout most of the crushed rock in the fault zone.

The Kergon mine workings (fig. 113) consist of a 40-foot crosscut adit driven southeast to the hanging wall in the northern part of the mineralized zone; exploratory drifts driven 30 feet northeast and about 30 feet southwest at the adit level; a 65-foot inclined winze down the hanging wall; an intermediate level with 10-foot drifts northeast and southwest; and a lower (65-foot) drift which extends 50 feet northeast and 145 feet southwest from the shaft. The lower drift is approximately 100 feet below the surface.

*Little Sparkler Mine.** Location: NE¼ sec. 17, T. 27 S., R. 32 E., M.D.M., 1¾ miles west of Miracle Hot Springs, 30 miles northeast of Bakersfield, on northwest side of Kern River. The mine is accessible by road from Keysville townsite. Ownership: Kern Uranium Co., P.O. Box 163, Rio Vista, Lloyd Scouler, president and operator, owns about 20 claims (1958).

The Little Sparkler deposit was discovered in the early part of 1956 following the discovery of the Miracle mine, which is about 2,000 feet to the east on the opposite side of the Kern River. Surface trenching started in 1956, underground development of the mine began in March 1957. Mining continued until November 20, 1957 when the mine was shut down temporarily because of a lack of a mill outlet for the ore. A total of 272 tons of ore averaging 0.50 percent U_3O_8 was shipped to the mill at the Vitro Uranium Co., Salt Lake City, Utah from surface and First level work (Lloyd Scouler, personal communication, 1959). The mine was reopened September 24, 1958 and was operated continuously to develop a second level until February 27, 1959 when the company reported it was again shut down, pending completion of evaluation studies, including long-range marketing probabilities.

Primary and secondary uranium minerals are in a moderately well-defined but poorly exposed shear zone (fig. 114) in medium- to coarse-grained Mesozoic biotite-hornblende quartz diorite or granodiorite. The shear zone strikes N. 50° W., dips an average of about 80° SW. and is at least 400 feet long. Its average width is 4 to 6 feet. In most places these shears are half an inch to several inches wide and are filled with dark-gray clayey gouge. Rocks between the hanging wall and footwall are brecciated and, in places, fractured parallel with the walls. They show little or no alteration and are locally stained with brownish to nearly black oxides of iron and possibly with manganese oxide. Scant pyrite was noted on the First level (60-foot level) and in a winze about 36 feet below the First level. The black oxides of uranium are fine grained and are in fractures, especially along the hanging

* Part of this information furnished by the mine owner and Arthur Richards, U.S.A.E.C.

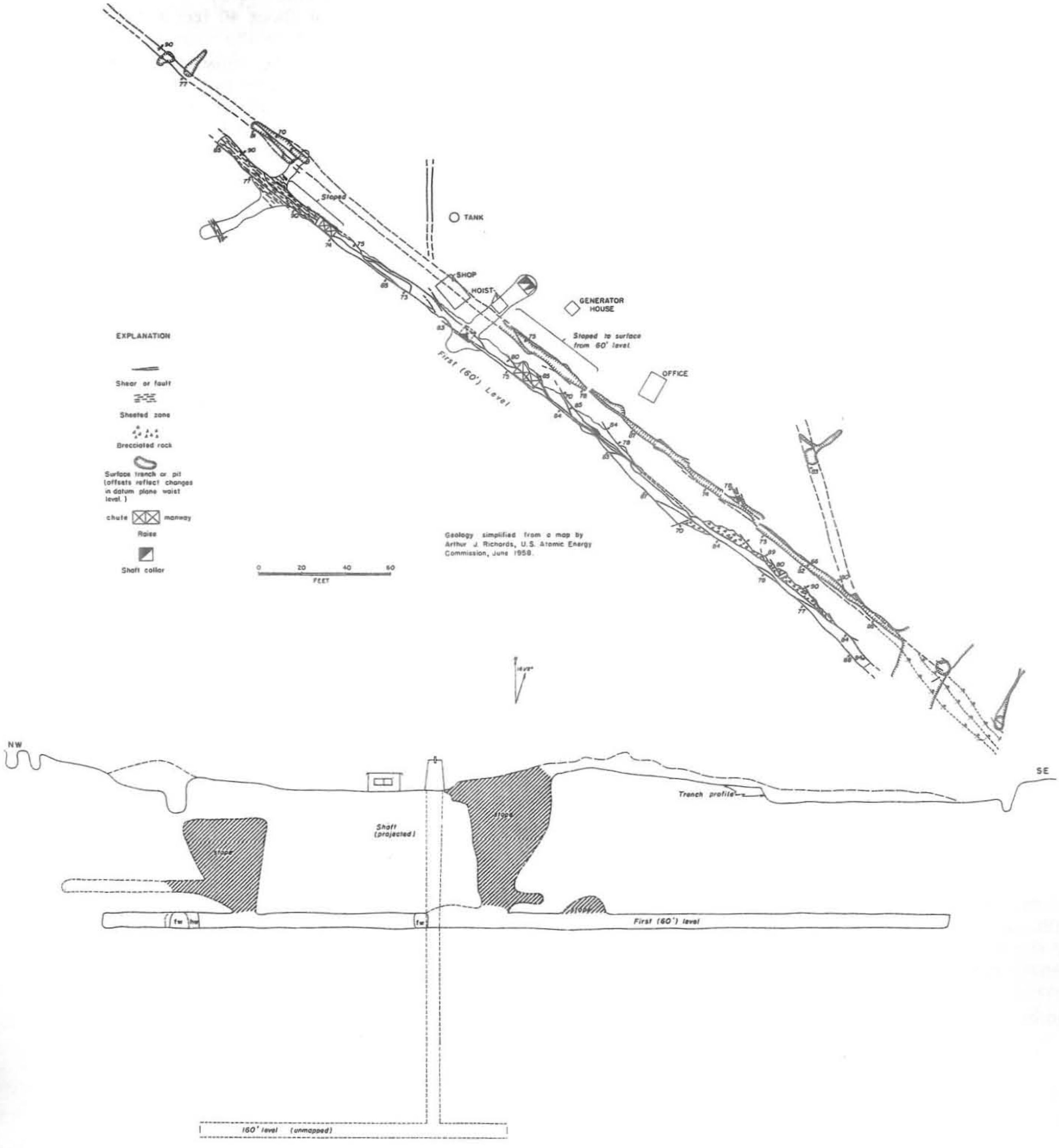


Figure 114. Composite geologic plan and longitudinal section of the Little Sparkler mine.

wall; in clayey gouge material; and between mineral grains in moderately decomposed granitic rock. Nearly vertical fractures, which strike approximately north, diverge from the main shears into the hanging wall and footwall. At least one of them contains traces of radioactive material.

The principal ore minerals are black pitchblende (uraninite) and coffinite. Yellow-green meta-zeunerite, torbernite (?), and yellow uranophane (?) extend to a depth of about 10 feet below the surface. The two principal ore bodies within the limits of the mine workings are the northwest and the southeast ore shoots, 80 to 100 feet apart.

The northwest ore shoot is generally 3 to 4 feet wide, about 15 feet in strike length on the 60-foot level of the mine, and extends 40 feet above the 60-foot level. It appears to be an underground continuation of an ore body, 15 feet long, exposed at the surface a few tens of feet farther northwest of the underground segment, but the bodies are not connected by mine workings. If the two segments are continuous, the northwest ore shoot rakes gently to the south for a total depth of at least 60 feet measured vertically.

The southeast ore shoot is 3 to 4 feet in average width, at least 70 feet in depth, and a maximum of about 40 feet in strike length. The ore shoot is an additional 45 feet in length but this segment is too narrow to mine. It is continuous from the 60 foot level of the mine to the surface, is crudely hourglass-shaped in cross section, and has vertical boundaries in longitudinal section. The lower limits of both ore shoots were not known in 1958.

The richer parts of each of the main ore shoots are most commonly adjacent to the hanging wall but in places are adjacent to the footwall. In places ore constitutes the entire width of the vein. At the southeast end of the surface trench, zones as wide as 2 feet contain at least 0.10 percent U_3O_8. About 200 feet of the known length of 400 feet of the vein exposed on the First level contains discontinuous pods or shoots of ore-grade material but part of it is not wide enough to constitute a mineable width and most of the known ore above the 60-foot level has been mined. Locally, the vein contains several percent of U_3O_8. The grade and extent of ore bodies below the 60-foot level were not fully determined by the owners by March 1959, but Lloyd Scouler (personal communication, 1959) states that the southeast drift on the 160-foot level appears to be along the top of another ore shoot.

The underground workings of the Little Sparkler mine (fig. 114) consist of a 60-foot, two-compartment vertical shaft, a 30-foot crosscut driven southwest to the vein on the 60-foot (First) level, and drifts extended about 140 feet to the northwest and 230 feet to the southeast from the southwest end of the crosscut. Raises have been driven in the vein 75 feet northwest and 25 feet southeast of the intersection of the crosscut and the 60-foot level, and two short crosscuts were driven northeast and southwest from the vein near the face of the northwest drift. The northwest ore shoot is stoped to a height of 35 to 45 feet above the 60-foot level at the northwest raise, and about 30 feet along strike. The southeast ore shoot is stoped to the surface from the 60-foot level along a maximum length of about 40 feet at the surface. A 100-foot winze was sunk in the vein at the intersection of the 60-foot level and the crosscut from the shaft. At the bottom of the winze (160-foot level) drifts were driven 102 feet northwest and about 30 feet southeast.

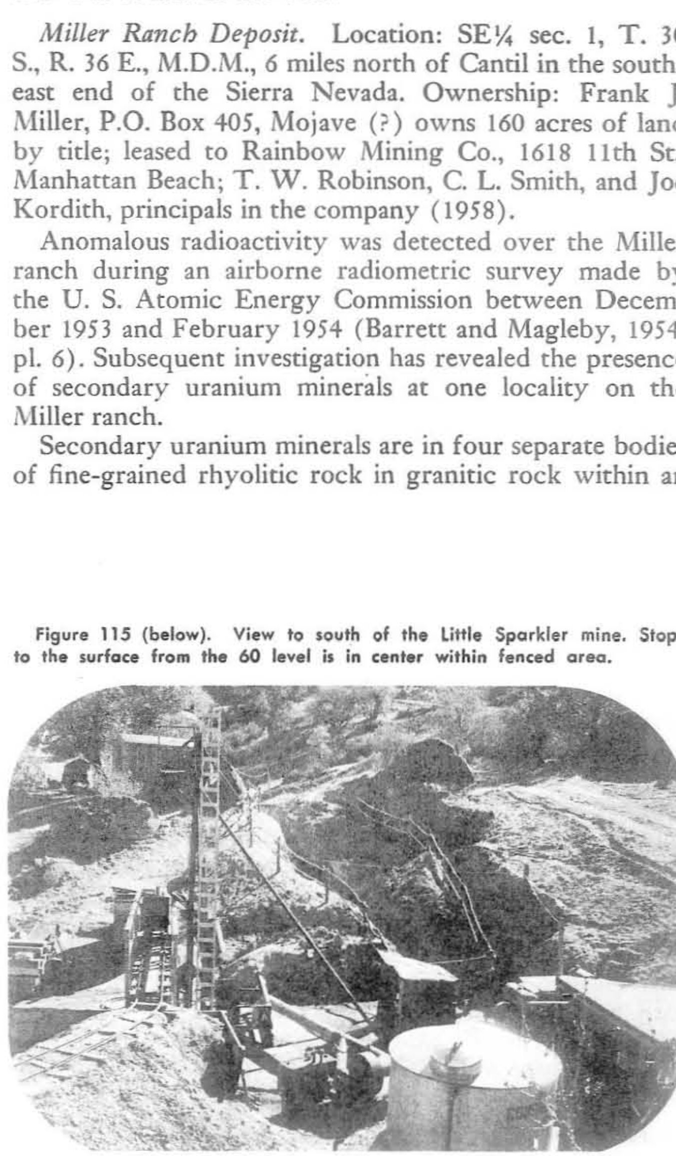
At the surface the vein is exposed southeast of the southeast stope in a 3- to 4-foot-wide trench 180 feet long and from 5 to 10 feet deep (fig. 115). Farther to the southeast, segments of the vein are exposed in crosscut trenches spaced at irregular intervals. The northwest part of the vein is exposed in a trench 2 to 4 feet wide, about 30 feet long, and from 2 to 15 feet deep. Vein material was mined and shipped from this northwest trench, and at a depth of 10 feet from the surface uraninite was found in the vein.

Miller Ranch Deposit. Location: SE¼ sec. 1, T. 30 S., R. 36 E., M.D.M., 6 miles north of Cantil in the southeast end of the Sierra Nevada. Ownership: Frank J. Miller, P.O. Box 405, Mojave (?) owns 160 acres of land by title; leased to Rainbow Mining Co., 1618 11th St., Manhattan Beach; T. W. Robinson, C. L. Smith, and Joe Kordith, principals in the company (1958).

Anomalous radioactivity was detected over the Miller ranch during an airborne radiometric survey made by the U. S. Atomic Energy Commission between December 1953 and February 1954 (Barrett and Magleby, 1954, pl. 6). Subsequent investigation has revealed the presence of secondary uranium minerals at one locality on the Miller ranch.

Secondary uranium minerals are in four separate bodies of fine-grained rhyolitic rock in granitic rock within an

Figure 115 (below). View to south of the Little Sparkler mine. Stope to the surface from the 60 level is in center within fenced area.



area approximately 500 yards square. The rhyolite bodies are poorly exposed, and discontinuous in outcrop. The largest one is the most extensively explored. It is a tabular body about 300 feet wide, 50 feet or more long, and perhaps 100 feet deep. It crops out as a small promontory along the east edge of a south-draining tributary to Jawbone Canyon. The other bodies are about 15 feet in maximum exposed dimension. The largest body contains intersecting fractures at the surface, and all of them contain secondary uranium minerals (autunite, schroeckingerite, and uranophane). The highest concentration of uranium minerals appears to be in a vertical zone of closely spaced fractures which strikes west a few feet south of the north edge of the rhyolite body.

The original exploration work was a west-driven adit that was extended about 20 feet into uranium-bearing fractured rhyolite a few feet below the crest of the hill. Most of the hilltop and the 20-foot adit were removed later during development of a surface excavation in an east-facing open cut. Beginning in May 1958, an adit was driven approximately eastward in granitic rocks about 100 feet below the crest of the hill. Rhyolitic rock containing traces of uranium was encountered 90 feet east from the portal at what appeared to be a gently northeast-dipping fault contact between rhyolite over granite.

The other rhyolite bodies have been explored by surface trenches and opencuts. The edge of a 15-foot-wide body about 200 feet southeast from the main rhyolite body was diamond-drilled but no ore bodies were penetrated. An adit driven southward about 150 feet in granite in the search for gold many years ago lacks only a few feet of being directly below this small rhyolite body.

*Miracle Mine.** Location: SE¼ sec. 17, T. 27 S., R. 32 E., M.D.M., 35 miles northeast of Bakersfield, adjacent to State Highway 178, on the southeast side of Kern River Canyon. Ownership: Henry B. Mann and associates, Taft, own the Buckeye group of 20 claims (1958).

The discovery of uranium veins at the Miracle mine followed the detection by H. B. Mann and associates of anomalous radioactivity in the vicinity of the mine site in January 1954. An exploration drift adit was quickly driven on the most promising vein, and in September 1954 H. B. Mann and associates sold their claims under lease and bond to the Wyoming Gulf Sulfur Corporation. Mining was suspended in 1955, as several lawsuits were filed against the corporation. Following settlement of the lawsuits in 1957 and the final awarding of quiet title to Wyoming Gulf Sulfur Corporation and H. B. Mann and associates, Wyoming Gulf Sulfur Corporation subsequently released their interest in the claims to H. B. Mann and associates.

Two rail carloads of uranium ore have been shipped from the Miracle mine. One carload consisting of 48.6 tons of ore averaging 0.62 percent of U_3O_8, was shipped to Vitro Chemical Co., Salt Lake City, Utah, on July 31, 1954, by H. B. Mann and associates. A second carload of ore, consisting of 42.6 tons of ore that averaged 0.18 percent of U_3O_8, was shipped to the same mill by Wyoming Gulf Sulfur Corporation in June 1955. Since regaining possession of the claims in 1958, the owners have worked the mine on a part-time basis.

The mine area and the surrounding region is underlain by Mesozoic quartz diorite which contains pegmatite dikes. The uranium mineralization is controlled principally by a fault zone which trends N. 15°-40° W., and dips steeply west along most of its trace; locally it dips steeply east. The fault zone has been traced along the surface for several hundred feet and is probably part of a fault system expressed in the topography on both sides of Kern River (W. A. Bowes, personal communication, 1954). Where exposed in workings of the Miracle mine (fig. 116), the fault zone averages three feet in width and is made up of sub-parallel to parallel shears and fractures in clayey gouge and decomposed quartz diorite.

The principal uranium minerals are autunite, which is most abundant to a depth of 50 feet, and carnotite (or possibly tyuyamunite), which is found below 50 feet from the surface. Three other secondary uranium minerals—uranophane, meta-autunite, and walpurgite—have been identified in the ore. The reported presence of uraninite or pitchblende was not verified by the writers. The associated vein minerals include abundant hydrous iron oxides, subordinate roscoelite, and minor fluorite and ilsemannite. No quartz or calcite have been found in the ore.

Uranium mineralization has been localized along several fractures on the Miracle property, but the larger of the observed bodies are in the main fault zone. Most of the ore mined to date has been removed from a 140-foot segment that extends southeastward from the portal of the main adit. Several tens of feet farther southeast of the adit portal are surface exposures of another mineralized segment of the fault zone. These two segments appear to be parts of a continuous ore zone which pitches 45° NW.

Most of the mine workings are on the main fault zone. A 395-foot drift adit was driven S. 35° E. from a point about 200 feet south and 150 feet higher than the paved highway in Kern River Canyon. The ore which comprised the first shipment from the mine was mined in the first 150 feet of the drift adit. Shallow surface excavations have been made elsewhere on the mine property. An excavation above the main adit was the source of the second carload shipment.

Owen Group. Location: Sec. 4, T. 32 S., R. 22 E., and sec. 33, T. 31 S., R. 22 E., M.D.M., 4 miles west of Fellows, on the north slope of Midway Peak in the Temblor Range, western Kern County. Some of the claims in the group are in San Luis Obispo County. Ownership: Howard Owen, 411 Asher St., Taft, H. A. Mitchell, 601 Price St., Taft, L. L. Curyea, Henry Baldwin, and Charles Deemer owns five lode and five placer claims (1958).

* Compiled in part from a report by Bowes (1957).

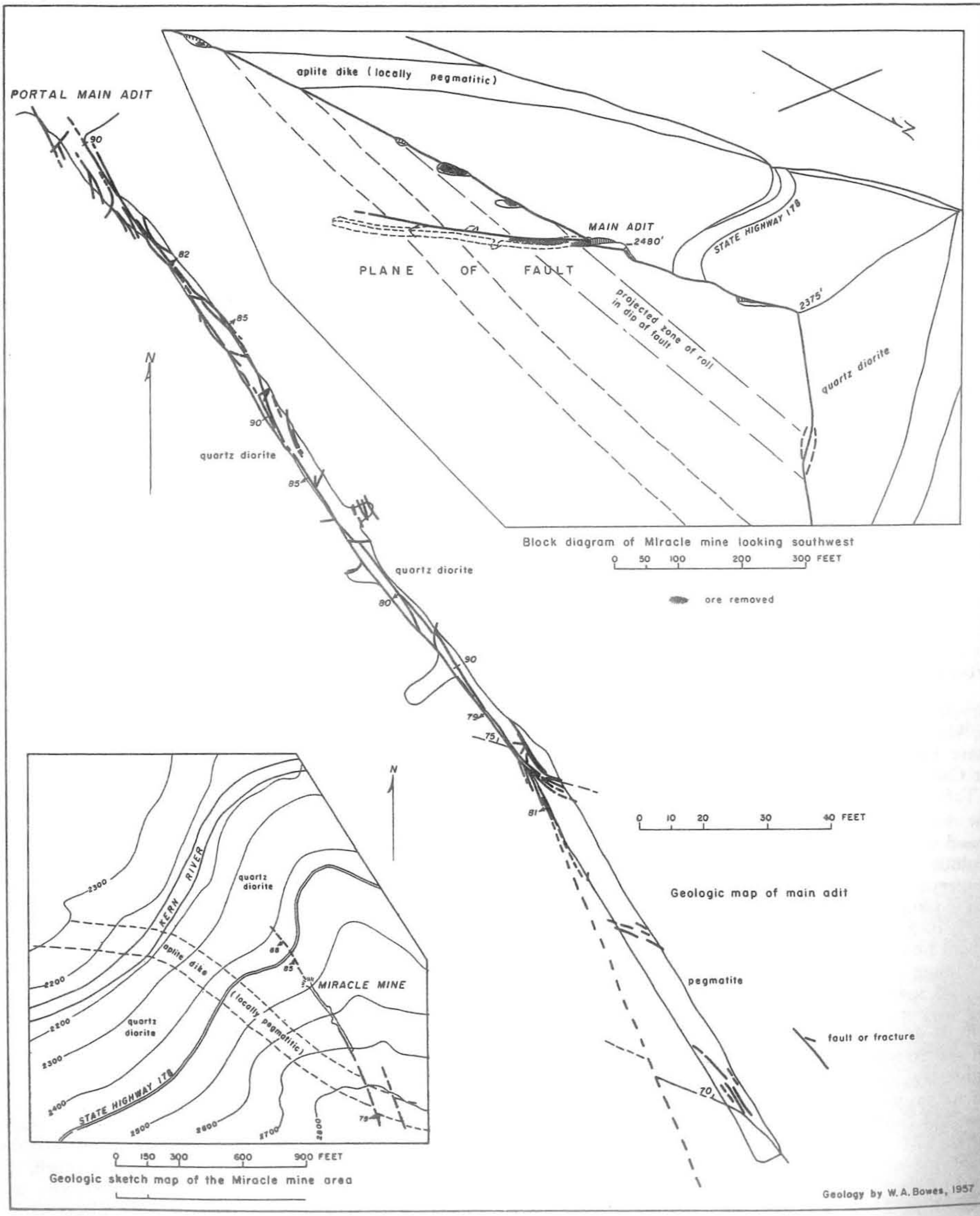


Figure 116. Maps and block diagram of the Miracle mine.

Autunite and other yellow secondary uranium minerals are widely disseminated in manganese-stained shear zones, which trend N. 50°-70° E. and dip 70° SE., in Miocene gypsiferous clayey shales, and in flat joints and bedding-plane surfaces. A rail carload of hand-selected and screened material which is reported to have contained 0.16 percent U_3O_8 was shipped to Vitro Chemical Co., Salt Lake City, Utah, in 1956.

An area 300 feet by 400 feet has been stripped clear with a bulldozer, and five benches have been developed in the exposed bedrock. Elsewhere on the property open cuts and trenches have been excavated.

*Pettit Ranch Deposit.** Location: Near the center of sec. 26, T. 26 S., R. 31 E., M.D.M., 1¼ miles west of Evans Flat, on upper Little Poso Creek. Ownership: Stockton family, Bakersfield (1958). The property is patented.

The Pettit Ranch was homesteaded very early in the history of Kern County and was patented by the Pettit family in 1864. No mining has been done on the ranch and the nearest mines are the gold mines of the Greenhorn Mountain district 1½ miles to the southeast. Although several uranium prospectors traversed the ranch no abnormal radioactivity was noted until Mr. William Herndon collected samples of the carbonaceous matter from Pettit Meadow and reduced them to ash. He found that the ash was highly radioactive and subsequent investigations by the U. S. Atomic Energy Commission confirmed the presence of uranium in the unburned peat-like material (Bowes, Bales, and Haselton, 1957, p. 7, 8). None of the material had been mined by the end of 1958.

The deposit consists of a mixture of uraniferous grasses, mosses, bog plants, and woody fragments which have accumulated in a shallow fault depression and have decayed to a peat-like substance. Detrital material derived from the underlying Mesozoic quartz monzonite is admixed with the peat-like material in various proportions. Uranium-bearing water from springs along a northeast-trending fault which underlies the bog, is circulating through the carbonaceous material and depositing an unidentified uraniferous material. Careful sampling by the U. S. Atomic Energy Commission in 1957 disclosed a mass measuring about 75 feet by 300 feet and 4 feet in average thickness which averaged 0.12 percent U_3O_8. A larger mass, which averaged less than 0.10 percent, also was delineated (Bowes, Bales, and Haselton, 1957, p. 5).

The U. S. Atomic Energy Commission has found that the ore is amenable to metallurgical extraction methods used in the recovery of uranium from uraniferous lignite. The basic steps are (1) separation of peat humus from the detrital fraction by gravity means, (2) roasting, (3) acid or carbonate leaching, and (4) precipitation.

*Radiation (Embree Property) Prospect.*** Location: S½ sec. 24, T. 27 S., R. 33 E., M.D.M., 6½ miles southeast of Bodfish, on southwest of slope of Laura Peak, northeast side of Erskine Creek. Ownership: Mary Flood, Los Angeles owns the land by title (1958).

Detection of radioactive quartzite float led to the discovery of the Radiation deposit by Frank Liebel in September 1954. L. G. Embree of Kernville began developing the property soon afterwards and by December 1954 he had excavated access roads, exploratory trenches and open cuts, and 370 feet of underground workings. Although selected rock samples containing as much as 3.0 percent U_3O_8 were found on the property, no shipments of uranium ore had been made by August 1956 when mining was ceased.

The most intensely radioactive material consists of dark-gray to black uraniferous veinlets in pre-Cretaceous quartzite near a contact between quartzite and gneiss. The contact zone contains brecciated, sheared, and gouge-rich material. It trends northeast, and dips steeply northwest to vertical. The zone is several feet thick and grades into gneiss on the southeast side and into altered quartzite on the northwest side. Calcic marble is exposed several tens of feet north of the quartzite and probably is in layers parallel to it. Pitchblende and gummite were identified tentatively by the U. S. Atomic Energy Commission and traces of yellow and bright-green secondary uranium minerals were also found. The presence of fluorite is suggested by CaF_2 in a sample assayed by the U. S. Atomic Energy Commission. Although the contact between quartzite and gneiss is many tens of feet long, the radioactive lenses and veinlets found to date are too small and too widely separated to be mined profitably.

The first working on the property was a bulldozer cut at the point of discovery. Later, an adit was driven 110 feet northwestward and a drift was extended 45 feet northeast along the contact which was encountered 95 feet from the portal (fig. 117). The drift extends to a point nearly directly beneath the bulldozed open cut and parts of the drift are caved. The portal of a lower adit is about 600 feet southwest of the discovery cut and 75 feet lower in elevation. The adit extends northeast approximately 100 feet from the portal then follows an irregular northward course for 80 feet through foliated gneiss to the contact zone where it extends about 80 feet northeast along the contact.

Verdi Development Company Deposits. Location: Near center of sec. 36, T. 10 N., R. 13 W., S.B.M., Mojave district, about 4½ miles northwest of Rosamond, on both sides of the Mojave-Tropico Road in a group of low-lying hills. Ownership: California State Land (school section); formerly leased by Verdi Development Company, 2623 Hyperion Avenue, Los Angeles (1957).

The U. S. Atomic Energy Commission discovered three radioactive anomalies in western Kern County by airborne radiometric survey in December 1953 (Barrett and Magleby, 1954). The property underlying one of these, known as anomaly No. 3, was acquired by lease by the Verdi Development Company in January 1954. The company explored and developed the property ex-

* Compiled from Bowes, Bales, and Haselton (1957).
** Information obtained mostly from a description by Walker, Lovering, and Stephens (1954, p. 31, 32).

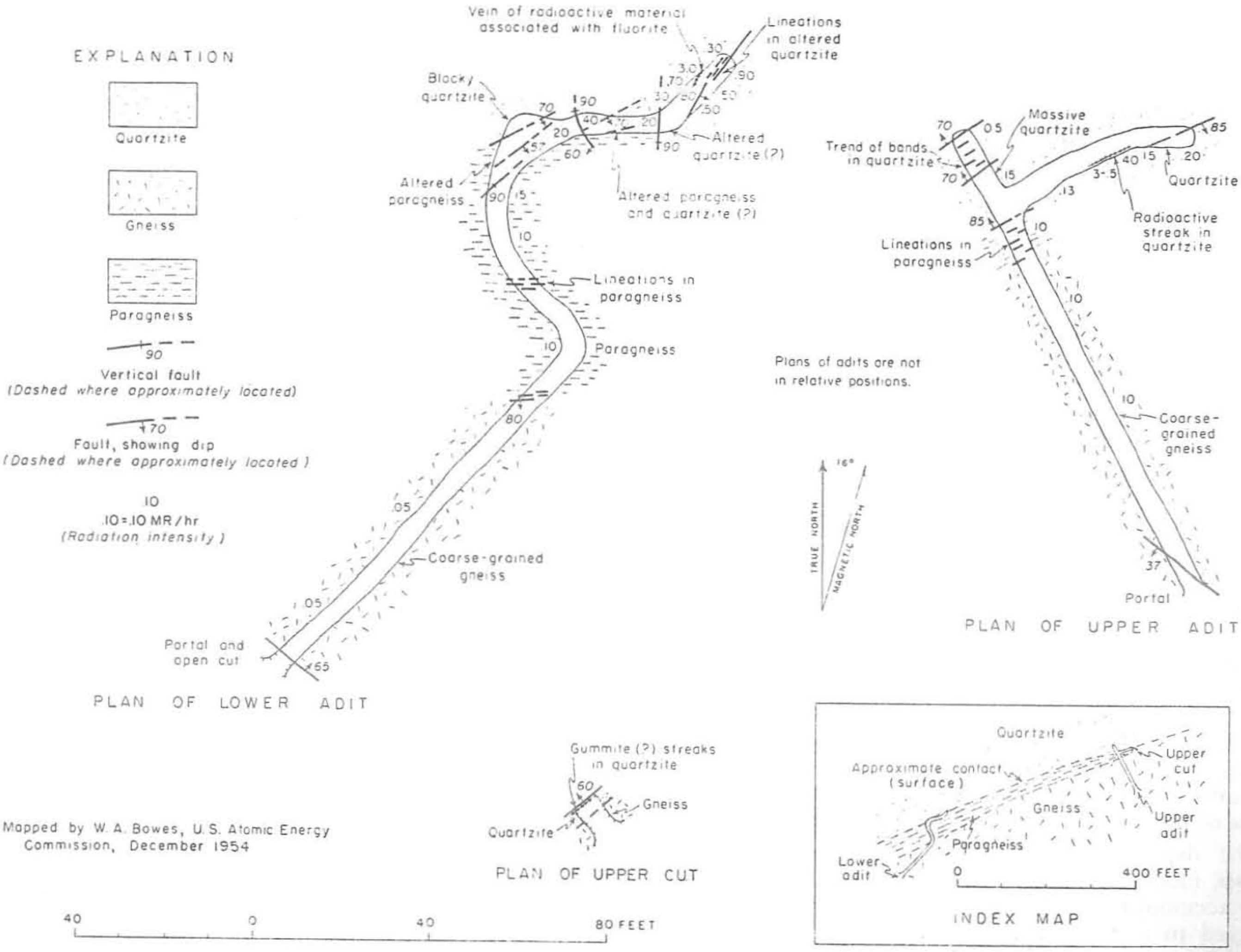


Figure 117. Geologic maps of the Radiation mine workings.

tensively during the period 1954 to 1957, and at the same time converted the old Standard gold mill to a uranium mill (fig. 118). The only ore mined was used experimentally and yielded small amounts of yellow cake at the mill about 6 miles northeast of the uranium property. The mill was intact and in good condition late in 1958.

The mineralized area is underlain by weathered Mesozoic quartz monzonite in fault contact with pyroclastic rocks in the lower part of the Tropico group as described by Dibblee (1958, p. 135-139). Unaltered quartz monzonite aplite is locally adjacent to the mineralized fracture zones. The fault, separating pyroclastic rocks on the north from quartz monzonite on the south, strikes N. 65° E. and dips 55° NW. It is known as the Verdi fault and marks the northern limit of mineralization at two localities.

The original prospect is 600 feet west of Mojave-Tropico Road and was developed first by a 90-foot crosscut adit and later by an open pit (Pit No. 1) 200 feet long, 150 feet wide, and about 30 feet deep at the north face (fig. 119). A 25-foot segment of the north end of the original adit remains in the rocks north of the pit.

The pit was excavated along a zone of narrow, ramifying fractures which strike N. 35°-55° W. and dips 55°-80° NE. in a body of aplitic quartz monzonite (Nelson, 1957, p. 19). The fracture zone is about 60 feet wide and extends about 120 feet southeastward from its termination at the Verdi fault in the face of the pit. Individual veinlets along the fractures range in width from a quarter of an inch to several inches and contain altered wall rock with coatings of meta-autunite, and radiating aggregates of uranophane (Nelson, 1957, p. 25). Meta-autunite also is disseminated in quartz monzonite adjacent to the fractures.

About 1,300 feet northeast of Pit No. 1, two additional pits, 150 feet apart, were excavated. The most northerly (Pit No. 2) is 50 to 75 feet wide, 200 feet long, and about 50 feet deep at the face on the south end. Pit No.

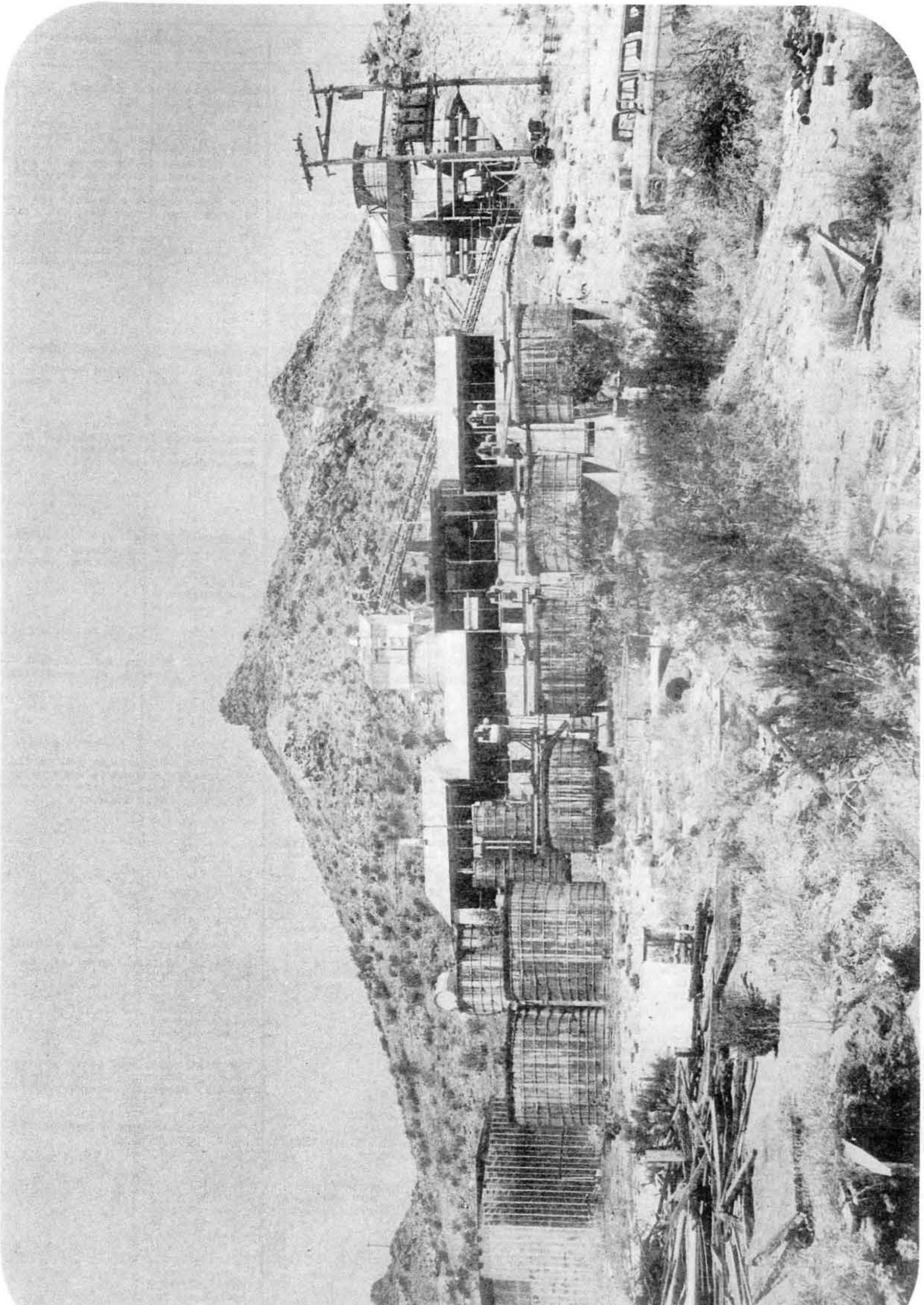


Figure 118. View to north of the Standard uranium mill. This former gold mill was entirely reorganized for processing of uranium ore by the Verdi Development Company.

URANIUM

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Allen property				See Utopia claims (Walker, Lovering, Stephens 56:10, 31).
642	Beryl (Josie Bishop group) group	NW¼ sec. 30, T29S, R37W, MDM, 24 miles northeast of Mojave, 3 miles east of U.S. Hwy. 6	Heirs of Mrs. J. S. Bishop estate (A. S. Bishop W. M. Bishop, Beryl Bishop Marsh, J. P. Bishop, Eugenia Bishop King, H. D. Cook, addresses undetermined, and A. H. Bishop, P.O. Box 542, Trona) (1958)	Gold- and copper-bearing quartz veins in rhyolitic dikes and granitic rocks. Anomalous radioactivity is associated with irregular, gray sulfide-bearing veinlets in a vertical, N. 50° W.-trending dike in granitic rocks. Dike is pale tan to gray, fine-grained vesicular, rhyolitic rock about 25 feet wide and at least 150 feet long. Secondary uranium minerals, principally autunite, occur to a maximum depth of 60 feet in the shaft below which point the uranium mineral is undetermined but is probably uraninite associated with sulfide-bearing veinlets.	Twelve lode claims. Radioactive material first known about 1931. Developed by shafts on several claims. Principal work has been on Beryl No. 1 and Beryl No. 4 claims. Shaft on Beryl No. 1 is 35 feet deep. Beryl No. 4 shaft is 103 feet deep with 3 crosscuts maximum of 18 feet long extend NW., SW., and SE. from bottom of the shaft. Mr. A. H. Bishop works part time in the shaft. (Tucker, Sampson, Oakeshott 49:210-211, 254t; Walker, Lovering, Stephens 56:10t, 17).
643	Big Bully prospect	Reported in sec. 6, T29S, R38E, MDM, northwest flank of El Paso Mts. 9¾ miles north of Cantil	William Hamilton, 3051 Antelo View Dr., Los Angeles (1954)	Secondary uranium minerals in chert bed 4 feet thick which underlies limy siltstone. Bed is in Ricardo formation of Pliocene age.	A prospect. Development undetermined.
644	Bluett prospect	NE¼ sec. 9, T10N, R13W, SBM, Mojave dist., 6½ miles northwest of Rosamond on north flank of Willow Springs Mt.	Walter Bluett, Bakersfield (1956)	Anomalous radioactivity amounting to 15 times background count along east-trending fault in Miocene tuffaceous sandstone and Cretaceous (?) quartz monzonite. Autunite with iron oxides found in shaft.	Developed by 20-foot shaft. No production. Idle. (Walker, Lovering, Stephens 56:9, 10t, 17).
645	Buster Tom prospect	SW¼ sec. 8, T11N, R14W, MDM, about 6 miles southeast of Tehachapi, ¼ mile southwest of Oak Cr. Rd., on north side of small peak in Tehachapi Mts.	C. A. Chroman and T. N. Pratt, Delano (1955)	Autunite, gummite (?), and unidentified dark gray radioactive mineral with iron and manganese oxides, quartz, and clay. In fault that strikes S. 60° E., dips 80° SW. in granitic rocks.	Developed by shallow surface trenches and bulldozed cut around top of small hill. (Walker, Lovering, Stephens 56: 10t, 17).
646	Dancing Devil No. 16 prospect	Sec. 23, T27S, R31E, about 7 miles west of Miracle Hot Springs on steep north slope of Kern River Cyn.	J. A. Brinkley, Ray Linton, and Ron Adams, Los Angeles (1955)	Anomalous radioactivity associated with biotite in pegmatite in granite.	No uranium minerals identified. (Walker, Lovering, Stephens 56:10t, 30-31).
647	Dawn claims	SW¼ sec. 13, T29S, R37E, MDM, 6 3/4 miles north of Cantil, in tributary cyn. to Redrock Cyn., one mile east of U.S. Hwy. 6	C. E. Reed, 13801 S. Vermont, Gardena C. R., H. L., and J. E. Stewart, addresses undetermined (1958)	Very thin coatings of secondary uranium minerals, probably mostly uranophane, on fractured silicified clay of Ricardo formation (Pliocene). Mineralization mostly in one bed of pale green clayey material a few inches thick exposed for a strike distance of several tens of feet on the south side of a hill and down a gentle dip to north on west end of hill. Mineralization is very weak and spotty. Mineralized layer underlies cherty or opal layer which forms small cliff on edge of hill.	Developed by removing few cubic yards of material from west side of hill and excavating shallow pits on top of hill. No production. Idle.
648	Dono-han (Section 10 anomaly) prospect	N½S½ sec. 10, T9N, R13W, SBM, ½ mile northwest of Tropico Hill and 4½ miles west-northwest of Rosamond	Rosamond Mining Co., 617 South 5th St., Las Vegas, Nevada (1958)	Secondary uranium minerals in fractured andesite.	See text (Walker, Lovering, Stephens 56:9, 11t, 17).
	Embree property				See text under Radiation prospect. (Troxel, Stinson, Chesterman 57:678; Walker, Lovering, Stephens 56:11t, 31, 32).
649	Emerald Queen prospect	Sec. 35 (?), T32S, R35E, MDM, 5 miles north of Mojave, Tehachapi Mts.	Undetermined, 1956	Secondary uranium minerals as fracture coatings and disseminated in tuffaceous sandstone.	(Walker, Lovering, Stephens 56:11t).

URANIUM, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
650	Gasko group	Sec. 33, T31S, R22E, MDM, 4 miles west of Fellows, northeast side of Temblor Range	George Mezo, Box T, Taft, R. H. Kirkpatrick, 101 San Emidio, Taft, and Leon Sutliff, 226 Warren, Taft; leased to Crown Uranium Co., Taft (1958)	Autunite is principal uranium mineral. Occurs as coatings on fractures in northwest-trending, vertical shear zone in siliceous silty shale. Fractures most numerous in 20-foot zone of shale between lime-rich sedimentary rocks. Uranium content of fractured shale is low.	Principal work is on Gasko No. 5 claim. Work consists of 2 adits about 50 feet apart vertically. Upper adit is 40 feet long; lower one is 35 feet long. A portable mill was being used in the early part of 1958 in an attempt to upgrade the uranium-bearing shale. Results of attempt to upgrade the material on the property not determined. See also in sulfur section.
651	Geeslin-Fiscus property	Sec. 35, T32S, R23E, MDM, and secs. 31, 32, T12N, R24W, SBM, 2½ miles south of Taft	Irvin Geeslin, 418 Phillippine St. Taft, and Mrs. Fiscus, address undetermined (1958)	Autunite, meta-autunite, and other secondary uranium minerals coat fractures and bedding planes in late Miocane shale and siltstone. Locally the rocks are altered and stained with iron and manganese oxides. Gypsum veinlets are moderately common in the rocks. Regional strike of rocks is N. 35° W.; dip is 65° NE.	Developed by open cuts and trenches. Highest assay by U. S. Atomic Energy Commission was 0.32 percent of U_3O_8. This property, discovered in September, 1954, was the first discovery of uranium in Taft-McKittrick area of Kern County. (Walker, Lovering, Stephens 56:11t, 34).
652	Goldenrod prospect	Sec. 4, T9N, R13W, SBM, Mojave dist., 5 miles northwest of Rosamond	Undetermined, 1958	Slight concentrations of an unidentified radioactive mineral with iron oxides sparsely disseminated in Tertiary dacite. Dacite is flow banded, auto brecciated, and conspicuously jointed.	Undeveloped in 1952. Selected samples assayed .001 and 041 U_3O_8 (A.E.C.) (Walker, Lovering, Stephens 56:9, 11t, 15).
	Hicks lease				See Verdi Development Co. deposit in text.
	Josie Bishop group				See Beryl group (Walker, Lovering, and Stephens 49:10t, 17).
653	Jumpin claim	Sec. 9, 10, T9N, R13W, SBM, Mojave dist., one mile west of Tropico Hill, 6 miles west-northwest of Rosamond	Undetermined, 1958; Sam Cytron, Beverly Hills (1951)	Autunite and gummite (?) with iron oxides as fracture coatings in an altered rhyolite dike that is intrusive into Cretaceous (?) quartz monzonite.	Developed by 10-foot discovery hole, 25-foot trench, and shallow cuts. Selected samples averaged .02 percent U_3O_8. Idle. (Walker, Lovering, Stephens 56:9, 11t, 15).
654	Kergon mine	NW¼ sec. 20, T27S, R32E, MDM, 35 miles northeast of Bakersfield, adjacent to State Hwy. 178 on southeast side of Kern River Cyn.	Great Lakes Oil and Chemical Co., 417 S. Hill St., Los Angeles (1958)	Primary and secondary uranium minerals in 2 sets of fractures in quartz diorite.	See text. (Bowes 57:21-28; Troxel, Stinson, Chesterman 57:678; Walker, Lovering, Stephens 56:11t, 30).
	Kervin prospect	SW¼ sec. 23, T27S, R35E, MDM, 9½ miles southeast of Weldon, on small knoll on north side of Bird Spring Pass Rd.	Henry P. Kervin, 2401 22nd St., Bakersfield (1958)	Torbernite and autunite in sheared and altered granitic and foliated fine-grained metasedimentary rocks. Maximum concentration of uranium minerals is along poorly-defined northeast-trending shear zone containing mixed rocks at contact between metamorphic and granitic rocks. Uranium minerals most commonly along the fractures in shear zone and locally disseminated throughout fine-grained altered rocks. Sample selected by U. S. Atomic Energy Commission contained 0.11 percent U_3O_8.	Approximately 30-foot shaft inclined 40° E. and bulldozed area few tens of feet in length and width and several feet deep. Two holes drilled to maximum of 26 feet in area a few feet east of shaft. Shaft was being deepened in mid-1958. No production. (Troxel, Stinson, Chesterman 57:678; Walker, Lovering, Stephens 56:11t, 31).
656	Landson group	NE¼SE¼ sec. 4, T11N, R24W, SBM, 2 miles northwest of Maricopa, north slope of steep-sided gully, southeast part of Temblor Range	Harlan N. Lingo, P.O. Box 655, 216 Poso St., Maricopa (1958) and others	Nonmarine Pliocene-Pleistocene arkosic sandstone and clayey siltstone dip gently to N. and S. over several square miles. Locally, iron-stained arkosic sandstone beds from 1 to 6 feet thick contain autunite. The autunite-bearing beds crop out in gullies in an area a few hundred yards long and wide. Most continuous exposure is about 100 feet long on LLT No. 1 claim. Also about 200 feet to east on same claim are 2 uranium-bearing beds about 25 feet apart stratigraphically. Owner reports highest assay is 0.95 percent U_3O_8 from eastern part of LLT No. 1 claim and average of 5½-foot bed is 0.43 percent U_3O_8.	Owners have 47 lode claims in 5 groups: LLT group, 10 claims in sec. 3 and 4; Coldwind group, 7 claims in sec. 7; Hi-Lo group, 7 claims in sec. 33 (T12N); Barnyard group, 21 claims in secs. 32, 33 (T12N), and 4; Jane group, 2 claims in sec. 4. Also 8 placer claims of 160. acres each in same general area. Principal work is on LLT No. 1 claim in NE¼ of sec. 4 on which 2 benches about 200 feet apart have been cut with a bulldozer and open cuts have been excavated in the most radioactive layers. Soil over gypsum-bearing surface mantle southeast of uranium claims has been scraped clean with bulldozer. No production.
657	Last Chance prospect	Reported in sec. 22, T27S, R32E, MDM, on east side of Clear Cr., about a quarter of a mile east (south?) of Miracle Hot Springs (1956); not confirmed, 1958	Robert Martin, Miracle Hot Springs (1955)	Anomalous radioactivity in surface cuts in tungsten prospect. Rocks in vicinity are granite, marble, and tactite.	No uranium minerals identified. (Walker, Lovering, Stephens 56:11t, 30).

URANIUM, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
658	Little Sparkler mine	NE¼SW¼ sec. 17, T27S, R32E, MDM, 1 3/4 miles west of Miracle Hot Springs, 30 miles northeast of Bakersfield, on northwest side of Kern River.	Kern Uranium Co., Lloyd Scouler, president, A. B. Scouler principal stockholder and operator, 3808 Apache Ave., Bakersfield (1959)	Northwest-trending shear zone in granitic rock contains secondary uranium minerals at the surface and uraninite and coffinite a few feet beneath the surface.	See text.
659	Lopberg (Loperna) prospect	SW¼SE¼ sec. 2, T30S, R21E, MDM, 5 miles northwest of McKittrick, on ridge between Frazer and McKittrick valleys	Charles Stenberg, and Frank Loperena, addresses undetermined (1955)	Yellow secondary uranium minerals in fractures and bedding planes of white siliceous shale (Miocene) and in thin seams and layers of gypsum. Patches of uranium-bearing rock occur in several places in this area with no apparent structural control.	Developed by two bulldozed trenches 10 to 15 feet deep and 30 feet long and two 6-foot-deep bulldozed trenches. Discovered October 1954; no production. (Walker, Lovering, Stephens 56:11t, 33).
	Loperna prospect				See Lopberg prospect. (Walker, Lovering, Stephens 56:11t, 33).
	Los Amigos prospect				See Tres Amigos prospect.
660	Lucky Seven prospect	NE¼ sec. 26, T27S, R35E, MDM, 10 miles southeast of Weldon, at northwest end of a ridge on south side of Bird Spring Pass Rd.	___ McKay and ___ Collins, addresses undetermined (1958)	Autunite and other secondary uranium minerals in two sets of fractures in granitic and metasedimentary rocks. Strongest set of fractures strikes N. 80° W., dips 70° NE., and terminates the southwest end of a set that strikes N. 20° E., dips 80° E. to vertical. Principal occurrence of uranium is in a 2-to 5-foot-wide lens of schistose fine-grained granitic rock in the N. 20° E.-trending fracture zone. It occurs about 20 feet below the surface on the north wall of a deep trench.	Six claims. Developed by a 20-foot deep bulldozed trench along the N. 80° W.-trending fractures and a 25-foot vertical shaft 15 feet northeast of the center of the trench. A drift adit along the N. 20° E.-trending fracture connects the trench and shaft. Two diamond drill holes drilled by U. S. Bureau of Mines in 1955; results not disclosed. Idle since early 1956. No production. (Troxel, Stinson, Chesterman 56:678).
661	M A K prospect	SW¼NE¼ sec. 26, T32S, R38E, MDM, 18 miles northeast of Mojave, on north slope of Castle Butte	C. L. Musick, Taft, L. C. Appling and O. A. Kent, addresses undetermined (1958)	Unidentified uranium minerals in Tertiary volcanic flow-layered rocks. Principal zones of radioactivity are associated with approximately west-trending shear zones which dip about 70° N.	Gently-north-sloping surface has been scraped clear with bulldozer in several hundred square yard area. Spots of highest radioactivity appear to have been drilled (probably to shallow depth) and some have been developed by shallow trenching. About 7 tons of ore of undisclosed grade mined and shipped to Vitro Chemical Co., Salt Lake City, Utah, in 1954 or 1955. Idle.
662	Mamie prospect	Sec. 18, T10N, R12W, SBM, Mojave dist., 6½ miles south-southwest of Mojave on the southwest flank of Soledad Mt.	John Lodge, Altadena (1956)	Anomalous radioactivity along shear zone in rhyolite. Shear strikes N. 32° W., dips 70° NE.	Idle. (Walker, Lovering, Stephens 56: 9, 11t, 17).
	Middle Butte mine				See text under gold.
663	Miller Ranch deposit	SE¼ sec. 1, T30S, R36E, MDM, 6 miles north of Cantil, southeast end of Sierra Nevada	Frank J. Miller, P.O. Box 405, Mojave (?); leased to Rainbow Mining Co., 1618 11th St., Manhattan Beach (1958)	Autunite, schroeckingerite, and uranophane in fractured rhyolite.	See text.
664	Miracle mine	SE¼ sec. 17, T27S, R32E, MDM, 35 miles northeast of Bakersfield, adjacent to State Hwy. 178, on southeast side of Kern River Cyn.	Henry B. Mann and associates, Taft (1958)	Primary and secondary uranium minerals in clayey gouge along fractures which trend N. 15°-40° W. and dip steeply west. Host rock is quartz diorite.	See text. (Bowes 57:13-20, 27; Troxel, Stinson, Chesterman 57:678; Walker, Lovering, Stephens 56:11t, 28, 30).
665	M J M group	Approx. center N½ sec. 26, T30S, R34E, MDM, 6½ miles east of Twin Oaks (in Caliente Cyn) ¼ mile south of road in Back Cyn.	Lloyd E. Johnson, 1507 Bernard Pl., Lester L. McCune, 3325 Lake St., and Jess W. Minter, 2617 Paula St., Bakersfield (1958)	Anomalous radioactivity several times background associated with zone of shattered quartzite, limestone, and argillite. Highest radioactivity is in quartzite exposed in N. 65° E.-trending trench. No radioactive minerals detected but parts of the walls of the trench are moderately radioactive.	Several claims in group. Principal development work is trench about 15 feet long, 3 feet wide, and 2 to 5 feet deep; shallow holes within a few feet of the trench. A bulldozed trench about 150 feet to the west is about 50 feet long, 10 to 15 feet wide, and 5 to 20 feet deep. At east end of bulldozed trench is 10-foot shaft. Idle in mid-1958.
666	Mojo prospect	NE¼SE¼ sec. 36, T28S, R33E, MDM, Piute Mts., 12 miles southeast of Bodfish	Undetermined, 1958	Poorly-defined zone of anomalous radioactivity in metasedimentary rocks. No uranium-bearing minerals noted in shallow surface cuts.	Explored by shallow trenches and pits. Idle in 1958.

URANIUM, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
667	Nob Hill claims	SE¼NW¼ sec. 26, T32S, R38E, MDM, 18 miles northeast of Mojave, on north slope of Castle Butte	Darl E. Ritter, 400 Belmont Ave., Bakersfield, and Wilson Call, address undetermined (1958)	The principal host rocks are green and gray Tertiary volcanic flows, tuffs, and agglomerates which strike N. 45°-80° E., dip 30°-50° SE. Unidentified radioactive minerals occur in 4-foot-thick zone along flow planes, particularly near iron-stained shears which strike N. 60°-75° E. and dip 75° to vertical.	Areas of most intense radioactivity have been excavated to depths of a few feet in trenches and bulldozed areas. A few holes were drilled in 1957 by Lakeview Mining Co., Lakeview, Oregon, but results of the drilling were undisclosed. No production. Idle.
668	Owen group	Sec. 4, T32S, R22E, and sec. 33, T31S, R22E, MDM, on north slope of Midway Pk., 4 miles west of Fellows	H. A. Mitchell, 601 Price St., Taft, L. L. Curea, Harold Owen, Henry Baldwin, Charles Deemer (1958)	Autunite and other secondary uranium minerals in Miocene sedimentary rocks.	See text. (Troxel, Stinson, Chesterman 57:678).
669	Pettit Ranch deposit	Center sec. 26, T26S, R31E, MDM, 1¼ miles west of Evans Flat, on upper Little Poso Cr.	Stockton family, Bakersfield (1958)	Uraniferous peat bog.	See text. (Bowes, Bales, Haselton 57:1-27).
670	Quality Oil Co. property	Sec. 22, T32S, R23E, MDM, 2 miles southwest of Taft	Quality Oil Co., Taft (1956)	Anomalous radioactivity associated with iron-stained fault breccia in Miocene siltstone and shale. Also in top 600 feet of oil wells nearby. No uranium minerals identified.	Minor surface cuts. No production (Walker, Lovering, Stephens 56:11t, 33-34).
	Rademacher mine			Torbernite occurs in iron- and manganese-stained shear zones.	See under gold. (Walker, Lovering, Stephens 56:11t, 19).
671	Radiation prospect	S½ sec. 24, T27S, R33E, MDM, 6½ miles southeast of Bodfish on northeast side of Erskine Cr.	Mary Flood, Los Angeles (1958)	Pitchblende (?) and yellow secondary uranium minerals in streaks and pockets in metamorphic rocks.	See text. (Troxel, Stinson, Chesterman 57:678; Walker, Lovering, Stephens 56: 11t, 31, 32).
672	Rosamond prospect	SW¼ sec. 25, T10N, R13W, SBM, Mojave dist., 10 miles south of Mojave, in the Rosamond Hills, straddling Mojave-Tropico Rd.	Southern Pacific Company (1952); formerly leased by Verdi Development Co., 2623 Hyperion Ave., Los Angeles (1957)	Thin coatings of autunite and gummite (?) on fractured surfaces and disseminated near faults in tuffaceous sediments of the Miocene Tropico group (Dibblee, 1958).	Developed by short adits, 20-foot shaft, and shallow pits. Average of 12 U.S. Atomic Energy Comm. samples of ore was 0.08 percent U_3O_8. (Nelson 57:14; Troxel, Stinson, Chesterman 57:675, 677, 678; Walker 53:37; Walker, Lovering, Stephens 56:9, 11t, 15).
673	S and W prospect	SE¼ sec. 10, T9N, R22W, SBM, San Emigdio Mts., 15 miles northwest of Frazier Park, 3/4 mile southeast of Marion Campgrounds	Dale West, 410 Fillmore, Taft (1955)	Carnotite and autunite in steeply dipping N. 35° E.-trending fault zone about 10 feet wide in metamorphic rocks. Fluorite associated with uranium minerals which are on SE. side of fault zone.	Four claims. Bulldozed crosscut trench 50 feet long, 16 feet wide, 12 feet deep. No production; idle.
	Section 10 anomaly				See text under Dono-han prospect. (Walker, Lovering, Stephens 56:9, 11t, 17).
674	Silver Lady group	SE cor. sec. 10, T30S, R36E, MDM, about 20 miles north of Mojave, 1 mile north of Blue Point in Jawbone Cyn.	Elizabeth A. De Lacy, Los Angeles (1957)	Metatorbernite and unidentified uranium minerals in fault zone containing brecciated granitic rocks and Tertiary volcanic and sedimentary rocks. Fault zone is 50 to 70 feet wide, at least 2,000 feet long, strikes N. 70° W., and is vertical. Brecciated rocks are locally altered to quartz-sericite rock. Fault zone contains many closely-spaced shears. A channel sample assayed by the U. S. Atomic Energy Comm. contained 0.071 percent U_3O_8; selected specimens contained as much as 31.1 percent U_3O_8.	Three unpatented lode claims. Developed by 18-foot prospect shaft for molybdenum or tungsten in quartz-sericite, other shallow trenches, and open cuts. An inclined hole was drilled from the north side of the fault zone in 1955; depth and results of drilling undetermined. No production. Idle. See also Blue Point prospect under tungsten (Nelson, Hillier 54:1-18; Walker, Lovering, Stephens 56: 11t, 32).
	Silver Strand prospect				See under tungsten.
675	Stillwell property	Sec. 35, T10N, R13W, SBM, Mojave dist., 5 miles northwest of Rosamond, in the Rosamond Hills	L. S. Stillwell, North Hollywood (1956)	Erratically-distributed autunite in joints, bedding planes, and disseminated near faults in tuffs and tuffaceous sediments.	Development limited to shallow trenches. Selected samples assayed 0.14 and 0.09 percent U_3O_8 (U.S. A.E.C.). (Walker, Lovering, Stephens 56:9, 11t, 15-17).
676	Sun Dog claim	Sec. 9, T28S, R32E, 1½ miles west of Havilah	Harold Hart, Long Beach (1956)	Anomalous radioactivity in pegmatite 10 to 20 feet thick and 600 feet long; in granitic rocks. No uranium-bearing minerals were identified from areas of highest radioactivity but selected samples assayed by U. S. Atomic Energy Comm. contained 0.105 percent U_3O_8. Some pyrite and arsenopyrite (?) occur in the pegmatite.	Contains 50 feet of underground workings and 2 surface cuts made by gold prospectors. A surface cut also made in search of uranium. No production. Idle. (Walker, Lovering, Stephens 56:11t, 31).

URANIUM, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
677	Surprise prospect	SW¼NE¼ sec. 3, T30S, R21E, MDM, 5 miles N. 60° W. of McKittrick, northeast edge of Temblor Range	W. B. Boardman, Lee Barker, P.O. Box 582, Maricopa, and Kenneth H. Hitchcock, 111 Pierce St., Taft (1955)	Autunite and other secondary uranium minerals occur in brecciated Miocene siliceous shale along a vertical to steeply south-dipping, N. 60° E.-striking fault zone. The uranium minerals occur as irregular patches within a 40-foot-wide by 200-foot-long segment of the fault zone mostly as coatings on fragments of shale or disseminated through finely-pulverized shale. Brecciated rocks are locally stained deep red and purple, veined with gypsum, and contain waxy bentonite. Highest assay obtained by U. S. Atomic Energy Comm. was 0.11 percent U_3O_8.	Discovered in September 1954. Owners have several claims but principal work is on Surprise No. 1 claim. A north-trending bulldozed trench across the fault zone is about 100 feet long and a maximum of 50 feet deep, 12 feet wide at the bottom, and about 50 feet wide at the top. Holes were drilled in the central part of the fault zone at the bottom of the trench. Depth and results of drilling undetermined. Other smaller trenches elsewhere on the other claims. No production. Idle. (Troxel, Stinson, Chesterman 57:678; Walker, Lovering, Stephens 56:11t, 33).
678	Trail prospect	SW¼SE¼ sec. 2, T30S, R21E, MDM, 5 miles northwest of McKittrick, on west side of McKittrick Valley	Eugene Billings, O. G. Billings, 619 Pierce St., Taft (1955)	Secondary uranium minerals occur as coatings on fractures and bedding plane surfaces of Miocene siliceous shale. Uranium-bearing areas are few feet in maximum dimension, low in uranium content, and probably of shallow depth. Highest concentrations of uranium are in brecciated rocks that contain gypsum.	Discovered in September 1954. Developed by bulldozed cuts and shallow trenches to few feet deep. No production. Idle.
679	Tres Amigos group (Los Amigos)	NW¼ sec. 20, T32S, R23W, MDM, 3 miles southeast of Fellows, on edge of Seventeen Cyn., Temblor Range	George Kilmer, 630 Center St., Taft, Wayne Case, and Leonard Garratt (1958)	Autunite and uranophane in surface mantle composed of chips of siliceous and diatomaceous Miocene shale. Underlying shales are gently dipping fractured shales. Principal concentrations of uranium minerals are in lower few inches of mantle and in upper few inches of underlying rocks.	Consists of 23 claims. Principal development is a "T"-shaped bulldozed trench on Tres Amigos No. 1 claim. Part of trench bearing N. is 100 feet long and 20 feet deep. Trench intersecting from W. is about 50 feet long. Also 2 adits each a few feet long; one driven east from center of "T" and one driven north from west leg of "T". Approximately 30 tons of plus 0.15 percent U_3O_8 uranium-bearing shale is stockpiled about 200 feet east of the workings. (Troxel, Stinson, Chesterman 57:678).
680	Twisselman Ranch prospect	Secs. 12, 13, T27S, R18E, MDM, about 7 miles southwest of Blackwells Corner, northeast flank of Temblor Range	Theodore F. Twisselman, 115 18th St., Paso Robles (1958); leased to St. Anthony Oil Co., 12636 Los Nietos Rd., Santa Fe Springs	Autunite, the principal uranium mineral, occurs as coatings in fractures and bedding plane surfaces in Miocene shales. In general, the upper 10 to 20 feet of rocks at the surface are slightly enriched in uranium. Locally, the enrichment is greatest near faults or shear zones.	Developed by bulldozed cuts. Twenty-four rotary holes were drilled by St. Anthony Oil Co. No production. Idle.
681	Utopia (Allen property) claims	NW¼NE¼ sec. 16, T27S, R33W, MDM, 2½ miles east of Bodfish, on north side of Erskine Cr. at mouth of cyn.	John Allen, San Diego, and Jim Anderson, P.O. Box 113, Bodfish (1955)	Anomalous radioactivity in calcareous material in fractures in weathered granitic rock and as hard cap on the surface. Calcareous rock crops out over several hundred square yards along the base of a low hill along the north side of Erskine Creek. Maximum radioactivity measured by the U. S. Atomic Energy Comm. occurs in black sooty material beneath the calcareous capping. Most of radioactivity probably caused by radium (Walker, Lovering, and Stephens, 1956, p. 31) but traces of uranium present in water from springs. Calcareous material considered for use as dimension stone in 1958. See also under travertine in limestone, etc., section.	Four unpatented claims. Explored by bulldozed cuts and small pits. Cold water flows from excavations. Some core drilling was done in mid-1955. In 1955, owners were planning to use soft coal to absorb uranium from water. Idle, 1958. (Walker, Lovering, Stephens 56:10t, 31).
682	Vanuray prospect	Sec. 26, T11N, R8W, SBM, about 2½ miles northwest of Boron	C. J. Roycroft, Brown (1956)	Carnotite occurs with opal in fractures of shear zones and as sparse disseminations in sandy clay in and adjacent to the shear zones. Uranium concentrations are very low in grade.	Originally worked as a clay deposit. Uranium exposed in walls of an 18-foot pit about 100 feet in diameter. (Walker, Lovering, Stephens 56:11t, 19).
683	Verdi Development Co. deposit	Cen. sec. 36, T10N, R13W, SBM, Mojave dist., 4½ miles northwest of Rosamond, in group of low-lying hills	State of California (school section); formerly leased by Verdi Development Co., 2623 Hyperion Ave., Los Angeles (1957)	Meta-autunite and uranophane along fractures and disseminated in adjacent quartz monzonite.	See text. (Barrett, Magleby 54:9; Nelson 57:7-9, 12, 13, 19-25; Troxel, Stinson, Chesterman 57:675, 677; Walker, Lovering, Stephens 56:9, 11t, 15).
684	Wattenbarger prospect	Sec. 23, T25S, R31E, MDM, 3 miles west of Greenhorn Summit Lodge	Doyle Wattenbarger, 1020 Doyle, Oildale, and James Stewart, Oildale (1956)	Weakly radioactive pegmatite-aplite dike in granitic rocks. No uranium identified.	Developed by bulldozed cuts. No production. Idle. (Walker, Lovering, Stephens 56:11t, 31).

URANIUM, cont.

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
685	Wayne Case property	Sec. 25 (?), T27S, R31E, MDM, about 3 miles west of Miracle Hot Springs on State Hwy. 178	Wayne Case, 126 Lucard, Taft (1958)	Autunite in iron-stained shear zone which strikes N. 35° W., dips 85° NE.; in brecciated granodiorite. Samples selected by U. S. Atomic Energy Comm. assayed as much as 0.61 percent of U_3O_8.	Developed by open cuts. No production; idle. (Walker, Lovering, Stephens 56: 10t, 30).

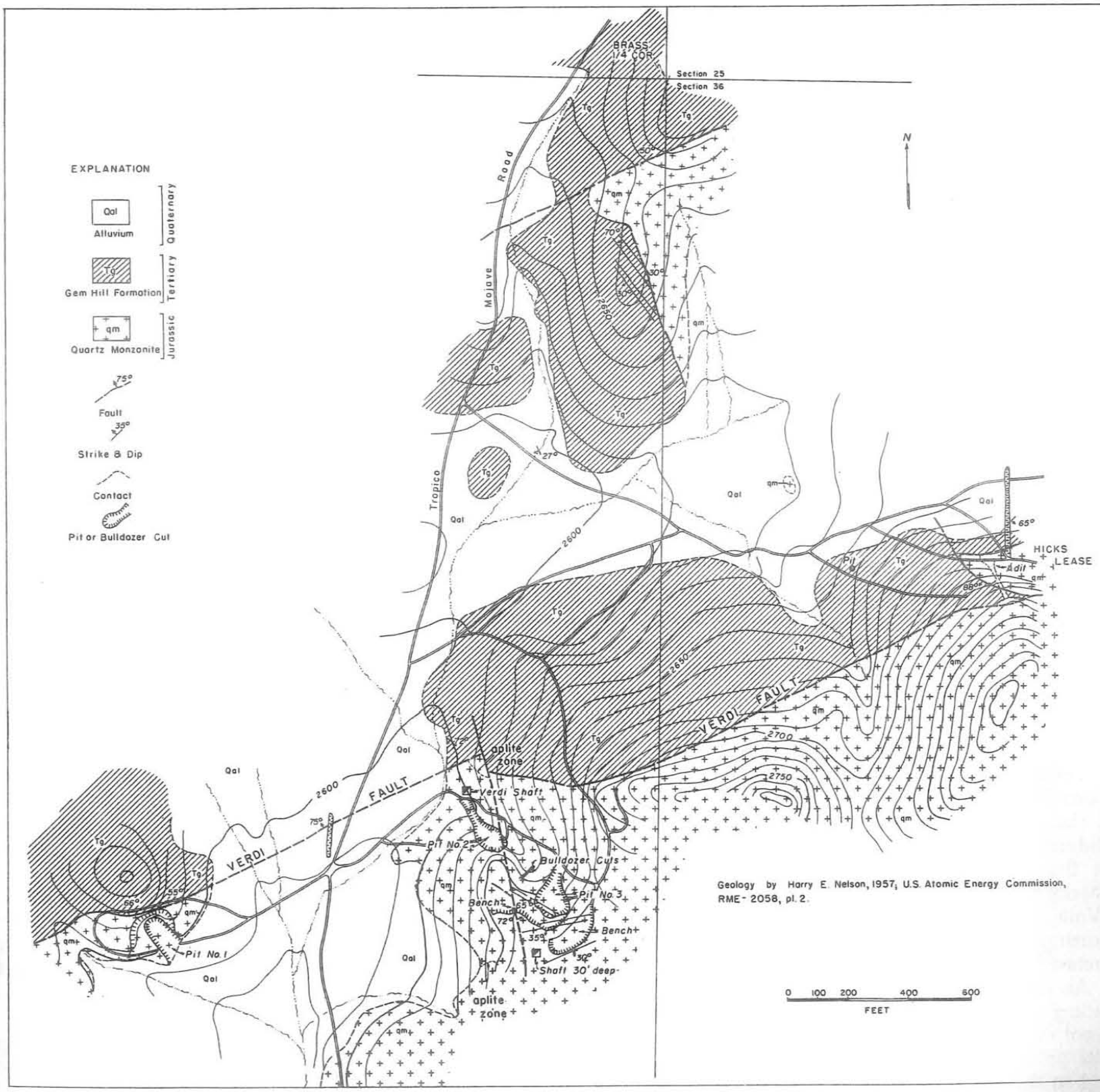


Figure 119. Geologic map of the Verdi Development Company deposit.

3, 150 feet farther south, is 50 to 100 feet wide, 150 feet long, and about 25 feet deep also at its south face.

Uranium mineralization in Pit No. 2 is along a minor fault that strikes N. 40° W. and dips 80°-85° NE. in aplitic quartz monzonite. The fault, which is exposed on the west side of the pit, is less than a foot wide and has been traced laterally for about 200 feet. A major fault is exposed at the southeast face of the pit and strikes N. 15° W. and dips 75° NE. It offsets the Verdi fault about 75 feet in a right-lateral sense (Nelson, 1957, p. 20).

Terminated against this fault, about 100 feet south of the south face of Pit No. 2, are two shears that apparently are the loci of uranium mineralization in Pit No. 3. These shears trend S. 55° E. from their termination against the hanging wall of the N. 14° W.-trending fault, and extend 175 feet southeast where they are cut off along a series of faults parallel to the Verdi fault. The mineralized shear that is farther southwest dips 55° SW.; the other dips 80° SW. (Nelson, 1957, pl. 3). Both these and the mineralized fault in Pit No. 2 are similar in character and composition to the fractures in Pit No. 1.

About 1,800 feet northeast of Pit No. 2 and also along the Verdi fault is a deposit known as the "Hicks Lease" which the Verdi Development Company held. Here, a crosscut adit was driven 125 feet S. 20° E. appended by a second crosscut driven 45 feet southwest from a point 40 feet from the portal. Drifts were extended 40 feet west and 20 feet east from a point near the face of the first crosscut. Meta-autunite is along fractures in the Verdi fault zone which is about 1 foot wide, strikes N. 75° E., and dips 75° NW. The fault separates quartz monzonite aplite on the southeast and pyroclastic rocks of the Tropico group on the northwest. A ¼-inch-wide chalcedony stringer containing scattered flakes of autunite was encountered at a point 27 feet from the junction of the southwest crosscut and the main crosscut adit. This stringer strikes N. 60° W. and dips steeply southwestward. It is along a fault contact between pyroclastic rocks on the southwest and quartz monzonite (Nelson, 1957, p. 20).

Wollastonite

The largest of the known wollastonite deposits in Kern County and the only commercial source in the county is the Code Siding deposit 9 miles south-southwest of Ridgecrest. Two deposits in the Sierra Nevada northeast of Bakersfield are principally of mineralogical interest (Melhase, 1936, p. 7; Hess and Larsen, 1921, p. 263). Wollastonite is in scheelite-bearing tactite bodies on the north edge of Walker Basin and probably is also in metasedimentary rocks elsewhere in the Sierra Nevada.

An undisclosed quantity of wollastonite from the Code Siding deposit was utilized in the manufacture of mineral wool in 1933-34 and 1938-41. This was the first commercial production of wollastonite in the United States, if not in the world.

Code Siding (Rademacher) Deposit. Location: Principal quarry is in SE¼SW¼ sec. 12, T. 28 S., R. 39 E., M.D.M.; the deposit extends southward into the center of the N½ sec. 13. The deposit is near the center of a small, north-draining valley at the northeast end of Black Mountain in El Paso Mountains, 2 miles southeast of Code Siding on the Southern Pacific Railway, and 9 miles south-southwest of Ridgecrest. Ownership: Ownership was undetermined in 1957; Sid Whaley, China Lake, owned the deposit by recent location in 1955.

The Code Siding deposit was the source of an undisclosed amount of wollastonite mined by John Thorndyke in 1933-34; and of material referred to as "calcium silicate" and mined by Johns-Manville Corp. in 1938-41. The rock was mined from a shallow quarry (fig. 115) and shipped to Johns-Manville Co., Los Angeles, by rail for use in mineral wool. About 2,000 cubic yards of rock was removed from the quarry. The deposit has not been worked since 1941.

The wollastonite is in metasedimentary rocks of probable Upper Paleozoic age in low hills near the center of a small valley. Sedimentary and volcanic rocks of Tertiary age crop out half a mile west in the low hills on the west side of the valley. Mesozoic intrusive rocks are exposed a quarter of a mile east of the wollastonite deposit and in the hills east of the valley. These range in composition from granodiorite to quartz monzonite. Metasedimentary rocks, consisting of marine limestone, shale, chert, and quartzite, crop out along the edge of the valley 1 mile due south of the wollastonite deposits. These rocks, included by Dibblee (1952, p. 15-19) in the Paleozoic Garlock series (Permian in part), are in intrusive contact with granitic rocks and the upper members of the series are probably at nearly the same stratigraphic position as the rocks at the wollastonite deposit. The wollastonite forms numerous coarse- to fine-grained gray layers interstratified with a nearly equal or greater proportion of fine-grained rock containing gray diopside and buff to tan grossularite garnet. The succession is several tens of feet in total thickness, but only about a third of it contains wollastonite. The rocks are intricately folded, trend northward, and dip steeply. The total area of outcrop of metasedimentary rocks is about half a mile north and south and a few hundred feet wide.

Most of the wollastonite was quarried near the crest of the northern hill (fig. 120). Several cubic yards of wollastonite-bearing rock also was broken loose in a small trench on the east side of the southern hill. The principal quarry is a bench about 100 feet long, north and south, and from 50 to 150 feet wide, and with a face 3 to 10 feet high. Most of the rock in the walls of the quarry is very fine grained and apparently diopsidic. A few small trenches and shallow pits lie along exposures of wollastonite-bearing rocks in the south end of the deposit.

Analyses of several samples of wollastonite, made for John T. Thorndyke by California Testing Laboratories, Los Angeles, averaged as follows: Silica (SiO_2)—47.12 percent, lime (CaO)—41.72 percent, magnesia (MgO)—2.72 percent, alkalies—trace, and iron (Fe_2O_3)—1.60 percent (Thorndyke, 1936, p. 133).

WOLLASTONITE

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
686	Code Siding (Rademacher, Wollastonite No. 1) deposit	SE¼SW¼ sec. 12, T28S, R39E, MDM, Rademacher dist., 9 miles south-southwest of Ridgecrest, 2 miles southeast of Code Siding on So. Pac. R.R.	Undetermined, 1958; Sid Whaley, China Lake (1955)	Wollastonite-rich layers and bodies in metamorphosed siliceous carbonate rocks of probable paleozoic age.	See text. (Thorndyke 36:133-135; Troxel 57:693).
	Rademacher				See Code Siding deposit.
	Wollastonite No. 1				See Code Siding deposit.

Zinc

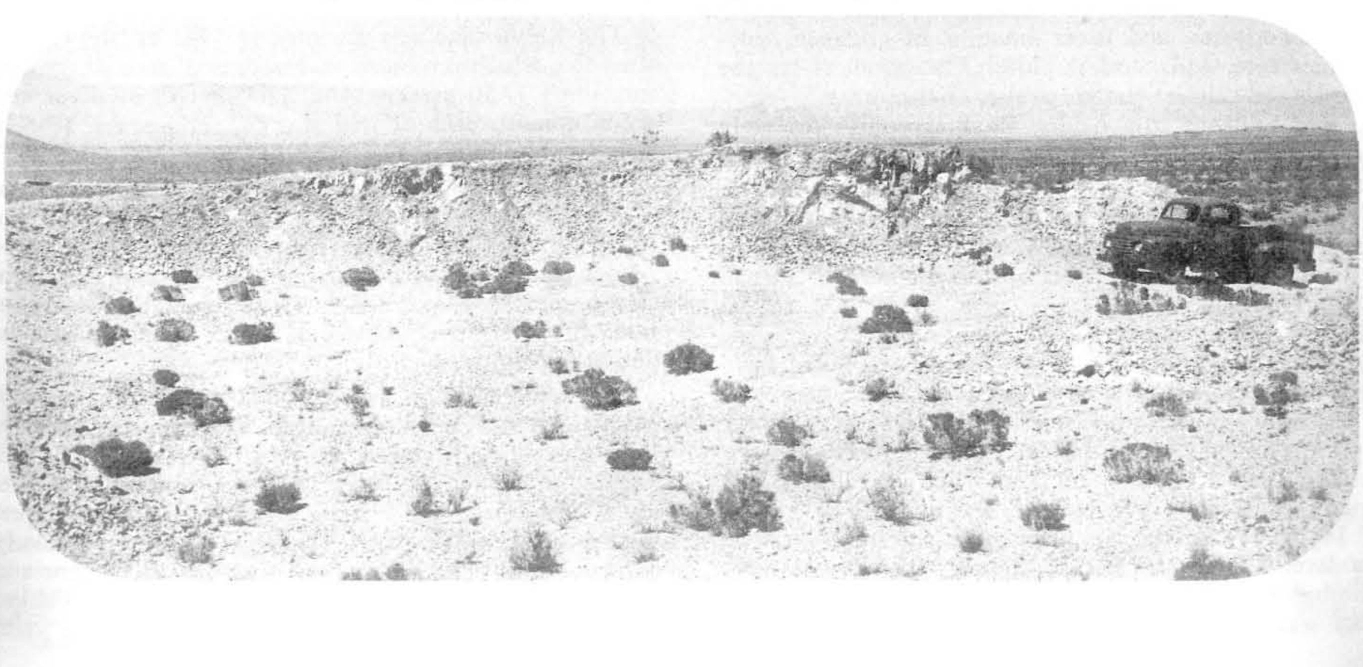
Two mines in Kern County have yielded substantial amounts of zinc ore. They are the Blackhawk mine in the Loraine district and the Kelso mine northeast of Gorman. Their combined output is about 60,000 pounds of zinc from 314 tons of ore, most of which was mined during the years 1942-45 and 1951. The principal zinc minerals are sphalerite (ZnS) and aurichalcite (zinc and copper carbonate).

Blackhawk Mine. Location: SW¼ sec. 5, T. 31 S., R. 33 E., M.D.M., Loraine district, at the head of Studhorse Canyon, 1 mile northeast of Eagle Peak. Ownership: The last known owners were Vera C. and Ralph C. Hatton, 1104 W. 99th St., Los Angeles (1949).

The first recorded production of ore from the Blackhawk mine was in 1944-45 when Pacific-Atlantic Metals Corp. of Pasadena mined and shipped about 200 tons of zinc-lead ore. A subsequent shipment of 14 tons of concentrates was made in 1951 by Ducor Mining Co. after treatment at the Amalie mill in Loraine. Total production through 1958 is about 35,000 pounds of zinc and 19,500 pounds of lead from less than 300 tons or ore. The ore averaged about 7½ percent zinc, about 4 percent lead, 0.5 percent copper, and 1 ounce of silver per ton.

At the Blackhawk mine site a lead and zinc deposit has formed along and near the northwestern contact of a large roof pendant of metamorphic rocks in quartz diorite. The pendant trends N. 30° E., is several miles long, and averages 1 mile in width. At the south part

Figure 120 (below). View to north of open pit at the Code Siding wollastonite deposit. Walls of pit consist wholly of fine-grained material that is presumably the same type of material that was removed.



ZINC

Map No.	Name of claim, mine, or group	Location	Owner (Name, address)	Geology	Remarks and references
	Black Jack mine				See under lead.
687	Blackhawk (Black Hawk) mine	SW¼ sec. 5, T31S, R33E, MDM, Loraine dist., at head of Studhorse Cyn.	Vera C., and Ralph C. Hatton, 1104 W. 99th St., Los Angeles (1958)	Irregular replacement of limestone near contact zone between metamorphic roof pendant and quartz diorite.	See text. (Goodwin 57:526t; Tucker 49: 238, 270t).
	Condor mine				See Kelso mine in text. (Goodwin 57: 528t, 529t, 533t; Tucker, Sampson 43:65).
	Cully and Hoyes mine				See Kelso mine in text. (Goodwin 57: 528t, 529t, 533t; Tucker, Sampson 45:65).
	Jenette-Grant prospect			Lenses of sphalerite in limestone.	See under gold. (Tucker, Sampson, Oakeshott 49:226).
688	Kelso (Condor, Cully and Hoyes, Tejon Ranch) mine	SE¼ sec. 23, T9N, R18W, SBM (proj.), 7 miles east of Lebec, southeast side of Tehachapi Mts., headwaters of Alamos Cr.	Tejon Ranch Co., P.O. Box 1560, Bakersfield (1958,	Zinc sulfides and carbonates in fractures in limestone.	See text. (Eric 48:256t; Goodwin 57: 528t, 529t, 533t; Tucker, Sampson 43:65; Tucker, Sampson, Oakeshott 49:276t).
	Tejon Ranch mine				See Kelso mine in text. (Goodwin 57: 528t, 529t, 533t; Tucker, Sampson 43:65).

of the mine area a rhyolite porphyry dike, a few tens of feet wide, has intruded the metasedimentary rocks along a zone parallel to and several feet southeast of the northwest edge of the pendant.

The deposit consists of irregular replacement bodies within a zone that strikes generally N. 45° E. and dips steeply northwest between the dike and the edge of the pendant. This zone is bounded on the southeast by the sharp contact of a fine-grained phase of the rhyolite dike, 1 to 2 feet wide, and on the northwest by a pale tactite body of undetermined thickness. Ore bodies appear to lie wholly within coarsely crystalline white limestone between the rhyolite and the tactite. Samples collected by the writers from the upper parts of the main ore body contained aurichalcite, sphalerite, cerussite, galena, and chalcopyrite; and lesser amounts of goslarite, zincite, malachite, and hemimorphite. The principal gangue minerals are calcite, quartz, pyrite, arsenopyrite, pyrrhotite, and hydrous iron oxides. Poor exposures probably have hindered prospecting for other ore bodies in the area.

The mine contains 400 to 500 feet of horizontal workings accessible by three adits. The upper and most southwesterly of them is a crosscut adit at the head of a small gulch. This adit was driven 50 feet N. 45° W. to the main ore deposit then S. 45° W. along its southeast edge. A stope 10 feet wide by 15 feet long was extended from the face of the crosscut and a shallow winze was sunk in the floor of the stope. Another and slightly larger stope was mined 25 feet southwest of the first stope. Two hundred feet northeast and about 100 feet below the upper adit, another crosscut adit was driven 115 feet N. 65° W. At a point 100 feet from the portal a 65-foot drift was extended several feet S. 65° W. then N. 65° W. Although the contact between rhyolite and metamorphic rocks was followed approximately down dip from the upper ore body, no ore was found. A third adit is several hundred feet north of the lower adit on the northwest slope of the ridge. It is a drift adit driven 100 feet S. 50° W. along a contact between quartz diorite and schist in what appears to be another ore zone. Some ore may have been mined from a vertical shaft of undetermined depth at the portal of the adit, but no ore was observed in the drift adit by the writers.

Kelso (Condor, Cully and Hoyes, Tejon Ranch) Mine. Location: SE½ sec. 24, T. 9 N., R. 18 W., S.B.M. (proj.), 7 miles east-northeast of Lebec, on southeast flank of Tehachapi Mountains, near head of Alamos Creek. Ownership: The mine is on private land owned by Tejon Ranch Co., P.O. Box 1560, Bakersfield (1958).

The Kelso mine was operated in 1943 by the Condor Zinc Co. which produced several tens of tons of ore that contained 17.50 percent zinc, 1.97 ounces of silver, and a few pounds each of lead and copper per ton (Goodwin, 1957, p. 528). The mine has been idle since 1943.

The deposit is a sulfide replacement of limestone near a contact with granite. The limestone is pre-Cretaceous in age, pale bluish white, where not stained by iron oxides, and medium to coarse grained. It contains intrusive bodies of Mesozoic biotite granite. The limestone body crops out over an area of several square miles west and south of the Kelso mine.

Zinc mineralization, accompanied by subordinate copper, lead, silver, and iron, appears to have penetrated the limestone along fractures which strike about N. 30° E. and dip steeply northwest. The two principal fractures are 4 feet apart and a third fracture is about 30 feet farther northeast of them. The veins in the two closely spaced fractures were reported to assay 30 percent and 33 percent of zinc across widths of 5 and 6 feet (Tucker and Sampson, 1943, p. 65), but the length of the veins

was not determined as surface exposures of the veins are very poor. The walls of the veins are poorly defined in the underground workings and the wall rocks are stained with iron oxides.

The workings of the Kelso mine include a lower, middle, and upper adit. The lower adit is the northeasternmost and was driven 60 feet S. 30° W. in what proved to be a barren part of the vein system. The middle adit was crosscut 40 feet to the south at a point 150 feet southwest of and 60 feet higher than the lower adit. The two southwestern veins were crossed in this adit and an 8-foot winze was sunk on them. This adit appears to have been the source of the ore mined and shipped in 1943. The upper adit is about 250 feet southwest of the middle adit and 100 to 125 feet above it. The upper adit was driven 600 feet S. 48° S., but, in 1942, was caved at 200 feet from the portal. Ore 15 to 20 feet wide was reported to have been encountered at a point 40 feet from the portal (Tucker and Sampson, 1943, p. 65).

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INDEX TO MINES, PROSPECTS, AND MINERAL DEPOSITS

Listed in the left column are names of mines, prospects, and mineral deposits that are described or tabulated in the mineral commodity sections of this report. In the right column are listed the mineral commodity sections in which the name appears. Italicized entries are names of mines or deposits that are described in the text of the commodity section as well as listed in the tabulation at the end of the commodity section.

Name	Commodity
Bitter Creek	Gypsum
Bitterwater Creek area	Gypsum
Black and Sullivan mine	Gold
Blackbird prospect	Tungsten
Black Bob mine	Gold
Black Eagle group	Perlite
Blackhawk mine	Zinc
Black Jack mine	Lead
Black Mountain	Gold
Black Mountain group	Pumice and pumicite
Black Mountain King mine	Tungsten
Black Point Copper	Gold
Black Sambo prospect	Antimony
Black Tiger claim	Gold
Blackwell Corners deposit	Sand and gravel
Blue Bell mine	Gold
Blue Bird claims	Tungsten
Blue Bird group	Tungsten
Blue Chief mine	Gold
Blue Diamond deposit	Limestone, dolomite, and cement
Blue Eagle group	Copper
Blue Eagle mine	Gold
Blue Gouge mine	Gold
Blue Jay prospect	Gold
Blue Mountain mine	Gold
Blue Point prospect	Tungsten
Bluett prospect	Uranium
Bob Allen	Gold
Bobby prospect	Gold
Bob Lee	Gold
Bobtail mine	Gold
Bodfish Nos. 1 and 2	Gold
Bonanza	Gold
Bond Buyer mine	Gold
Bond, Marshall	Borates
Bonnie Brea	Gold
Boron mine	Borates
Boron operations	Borates
Boston Belle claim	Gold
Boston Extension claim	Gold
Boston fraction claim	Gold
Boulder claim	Gold
Bousby	Antimony
Boushy	Antimony
Bowen	Gold
Bowman mine	Gold
Bright Spot	Gold
Bright Star mine	Gold
Bright Star prospect	Tungsten
Brite-Burton mine	Gold
British Lion	Gold
Brogan	Gold
Broken Axel group	Gold
Broken Spade claims	Gold
Brothers	Gold
Brown, J. W., Rock Plant	Sand and gravel
Brown-White mine	Clay
Bryan mine	Gold
Brymer prospect	Gold
Buck	Tungsten
Buckboard mine	Gold
Buckeye prospect	Tungsten
Buckhorn mine	Tungsten
Buckhorn Springs deposit	Borates
Buena Vista Lake	Gypsum
Buena Vista prospect	Tungsten
Buffalo	Antimony
Buffalo	Gold
Bulgarian Troubles mine	Gold

Name	Commodity
Bullion	Gold
Bull Moose No. 1, No. 2, Extension claims	Gold
Bull Run mine	Gold
Bully Boy mine	Gold
Burcham claim	Gold
Burning Moscow mine	Gold
Burris & Grant deposit	Quartz and feldspar
Burton-Brite-Blank mine	Gold
Buster Tom prospect	Uranium
Butler prospects	Iron
Butte Fraction claim	Gold
Butte mine	Gold
Butte mine	Tungsten
Butte prospect	Gold
Butte Wedge claim	Gold
Cactus Queen mine	Gold
Cadillac mine	Tungsten
Calcite placer No. 1 deposit	Limestone, dolomite, and cement
Calcium claim	Gold
Cal-Desert Gypsite Co.	Gypsum
Caldwell	Gold
California fullers earth deposit	Clay
California Gypsum and Mineral Co.	Gypsum
California Gypsum Hollow Tile Co.	Gypsum
California mine	Gold
California Portland Cement Company, Creal plant and deposits	Limestone, dolomite, and cement
Cal-Minerals	Roofing granule material
Calsilco pumice deposit	Pumice and pumicite
Cameron Lake	Salt
Camp Bird claim	Gold
Canada de las Uvas	Salt
Canady, J. R.	Gypsum
C and H Materials pit	Sand and gravel
Cane Springs	Gypsum
Canfield Co.'s mines	Gold
Cape Horn	Tungsten
Carbonate	Lead
Carbonate Queen	Copper
Carolina A	Gold
Carriso	Gypsum
Carter placer	Tungsten
Cash Register mine	Gold
Castle Butte mine	Gold
Caulay pit	Sand and gravel
Cave Springs	Gypsum
Chalk Cliff prospect	Specialty sand
Chamberlain group	Gold
Chamberlain silica deposit	Quartz and feldspar
Charity claim	Gold
Charles Reeves mine	Tungsten
Chevalier, Stuart	Borates
Chief claim	Gold
Chief group	Gold
Chief Assistant claim	Gold
Chief Commander claim	Gold
Chieftain	Gold
China Lake deposit	Borates
Christmas Tree prospect	Tungsten
Churchill	Silver
Cincinatti prospect	Gold
Clara Gibbons	Gold
Claraville placers	Gold
Claude mine	Tungsten
Clay Bank mine	Gold
Cluff Ranch deposit	Limestone, dolomite, and cement

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Name	Commodity
Elephant group	Gold
El Friday	Gold
Eli group	Gold
Elizabeth prospect	Gold
Elk claim	Gold
Ella group	Gold
Ellston prospect	Gold
El Paso Wells prospect	Borates
Elsey pit	Sand and gravel
Elsy and Groves	Gold
Embree property	Tungsten
Embree property	Uranium
Emerald mine	Gold
Emerald Queen prospect	Uranium
Emma	Gold
Empire	Gold
Enterprise	Gold
Erskine Creek	Antimony
Erskine Creek deposits	Limestone, dolomite, and cement
Esperanza	Gold
Esperanza mine	Gold
Esperanza prospect	Tungsten
Eureka	Gold
Eureka claim	Gold
Eva L.	Gold
Excel Mineral Company mine	Clay
Excelsior claim	Gold
Exchange prospect	Gold
Exposed Treasure mine	Gold
Extension Ajax claim	Gold
Extension Claim	Gold
Extension Karma claim	Gold
Fairmont	Gold
Fair View	Gold
Fairview mine	Gold
Fairy King claim	Gold
Fairy Prince claim	Gold
Fairy Queen claim	Gold
Fannin, C. L.	Gypsum
Fannin deposit	Gypsum
Fauntleroy, W. A. deposit	Gypsum
Faust prospect	Gold
Fawn	Gold
Fay	Gold
Fernandez group	Tungsten
Ferris mine	Gold
Ferris mine	Silver
Fickert-Durnal prospect	Mercury
Fidgie group	Tungsten
Filtrol Company clay deposit	Clay
Fine Gold group	Gold
Flamiofumes Co. prospect	Gold
Florence & Bertha	Gold
Florence claims	Gold
Fluorite claims	Fluorspar
Flying Dutchman	Gold
FOB mine	Tungsten
Foster Tucking Co.–Gypsum Dept.	Gypsum
Four Corners 2	Borates
Four Jacks	Gold
Four K prospect	Tungsten
Four Star	Lead
Four Star Mines group	Gold
Fraction	Gold
Fraction claim	Silver
Francis H., No. 1 claims	Gold
Frank and Rey	Gold
Frank claim	Gold

Name	Commodity
Fredle claim	Gold
Fremont Salt Co.	Salt
French deposit	Coal
French group	Copper
French mine	Gold
French Lillies claim	Gold
French Meadows mine	Gold
Friday Gulch mine	Gold
Galena group	Copper
Gallow Glass group	Copper
Gallup prospect	Gold
Garden City group	Gold
Gardner deposit	Tungsten
Garlock	Gold
Garnet placer claim	Gold
Garnishee mine	Gold
Gasko group	Sulfur
Gasko group	Uranium
Gateway claims	Gold
G B mine	Gold
Geeslin-Fiscus property	Uranium
Gem claim	Gold
Gem mine	Gold
Gem prospect	Copper
General Grant	Gold
General MacArthur prospect	Tungsten
Gessell, W. J.	Copper
Gilliam and Welch	Gold
Gimlet prospect	Silver
Girblick	Gold
Gladding McBean and Company deposit	Clay
Gladys claim	Gold
Gladys prospect	Gold
Glen Olive mine	Gold
Glorietta and Discarded claims	Gold
Gold Badger claims	Copper
Gold Bag mine	Gold
Gold Bar prospect	Gold
Gold Bug mine	Gold
Gold Coin claim	Gold
Gold Coin group	Gold
Gold Crown group	Gold
Gold Dollar	Gold
Golden Badger mine	Gold
Golden Carrier claim	Gold
Golden Cross	Gold
Golden Cross prospect	Silver
Golden Curry claim	Gold
Golden Eagle	Gold
Golden Eaglet and Queen claims	Copper
Golden Extension mine	Gold
Golden Glow prospect	Gold
Golden group	Gold
Golden Gulch Nos. 1 to 3 claims	Gold
Golden Oak claim	Gold
Golden Queen mine	Gold
Goldenrod prospect	Uranium
Golden Rule	Gold
Golden Rule claim	Gold
Golden Rule prospect	Gold
Golden Star	Gold
Golden Thorn	Gold
Golden Treasure	Gold
Golden Vault claim	Gold
Golden View claims	Copper
Gold Flint prospect	Gold
Gold Hill mine	Gold
Gold Hill No. 1 and No. 2 claims	Gold
Gold King	Gold

Name	Commodity
Independence claim	Gold
Independence prospect	Gold
Independent claim	Gold
Indian Queen prospect	Gold
Indian Springs prospect	Borates
Indian Wells Valley group	Gold
Intention claim	Gold
Iriquois prospect	Gold
Iron Blossom	Barite
Iron Canyon bentonite mine	Clay
Iron Hat group	Copper
Iron Mountain Nos. 1, 2 prospect	Iron
Iron Mountain prospect	Iron
Iron Peak prospect	Gold
Isabella	Gold
Isabella deposit	Limestone, dolomite, and cement
Isabella Extension	Gold
Isabella mine	Silver
Isabella Readimix pit	Sand and gravel
Isian Pk.	Gold
Island Mountain group	Gold
Jackpot group	Gold
Jackpot mine	Tungsten
Jack Rabbit mine	Gold
Jackson	Gold
Jameson deposit	Limestone, dolomite, and cement
Jammison deposit	Limestone, dolomite, and cement
J and L claim	Stone
Jane No. 1 prospect	Tungsten
Janney placers	Gold
Jasper prospect	Silver
Jawbone Canyon clay deposit	Clay
Jeff Davis mine	Gold
Jenette-Grant mine	Gold
Jenifer mine	Borates
Jennette mine	Gold
Jennie Lind claim	Gold
Jerry mine	Gold
Jerry prospect	Gold
Jersey Lily group	Tungsten
Jeweler Hill mine	Gold
Jewell group	Gold
J. Hodgson	Tungsten
Jim Crow claim	Gold
Jim's Gypsum mine	Gypsum
Joe Morina mine	Gold
Joe Walker mine	Gold
John L.	Gold
Joker	Gold
Jolly Girl	Gold
Josephine claim	Gold
Josephine mine	Gold
Josephine prospect	Gold
Josephine T. G.	Gold
Josie Bishop group	Uranium
Juan Dosie mine	Gold
Juanita W. claim	Gold
Judy Ann prospect	Gold
Julius Shades	Antimony
Julius Shades	Gold
Jumbo group	Gold
Jumbo mine	Gold
Jumpin claim	Uranium
Junction claim	Gold
June Ione mine	Tungsten
Juniper prospect	Tungsten
Kane Springs	Borates
Karma mine	Gold
Kate Hayes	Gold
Katie	Gold
Katydid claims	Gold
K C N claim	Gold
Keen deposit	Limestone, dolomite, and cement
Kelso Creek placers	Gold
Kelso mine	Zinc
Kennedy Minerals Company deposit	Limestone, dolomite, and cement
Kennedy Minerals Company mine	Clay
Kenneth B. Fraction claim	Gold
Kentucky, The	Gold
Kenyon mine	Gold
Keough prospect	Manganese
Kergon mine	Uranium
Kern County Brick Company	Clay
Kern County Consolidated Gold Mines	Gold
Kern County Gypsite Co.-I	Gypsum
Kern County Gypsite Co.-II	Gypsum
Kern Development Syndicate quarries	Stone
Kern Gypsum Mines	Gypsum
Kern Lake deposits	Gypsum
Kern Rock Co. pit	Sand and gravel
Kern Rock Co., Union Paving Co. pit	Sand and gravel
Kern Rock Co. Wheeler Ridge plant	Sand and gravel
Kerntung group	Tungsten
Kernville mine	Gold
Kervin prospect	Uranium
Keyes mine	Gold
Keyesville Mines placers	Gold
Keyesville Placer	Gold
Kim B. claims	Iron
King	Tungsten
King George group	Gold
King Lumber Company	Clay
Kings prospect	Gold
King Solomon	Gold
King Solomon mine	Gold
King Tungsten mine	Tungsten
Kinyon mine	Gold
Kinyou mine	Gold
Kirner	Gold
Klondike group	Gold
Knecht	Quartz and feldspar
Koehn, C. A.	Gypsum
Koehn deposit	Clay
Koehn, Jennie E.	Gypsum
Koehn Lake	Borates
Koehn Lake	Gypsum
Kohler	Borates
Kootenai claim	Gold
Koskmyre prospect	Sulfur
Kramer deposit	Limestone, dolomite, and cement
Kramer pit	Sand and gravel
La Corona Oil and Asphalt Co.	Gypsum
La Crosse prospect	Gold
Ladd prospect	Gold
Lady Belle	Gold
Lady Langtry claim	Gold
Lady Castaic deposit	Iron
Landson group	Uranium
Lange mine	Quartz and feldspar
Lass, Archer E.	Gold
Last Chance	Gold
Last Chance Canyon deposit	Fluorspar
Last Chance claim	Gold
Last Chance Mine	Limestone, dolomite, and cement
Last Chance mine	Gold

Name	Commodity
Middle Butte mine	Gold
Midlothian mine	Manganese
Miles prospect	Gold
Miller group	Gold
Miller prospect	Tungsten
Miller Ranch deposit	Uranium
Milwaukee prospect	Gold
Mineralite-Azurite group	Tungsten
Mineral Spring	Gold
Mingus deposit	Clay
Minnehaha mine	Gold
Minnehaha mine	Tungsten
Minnie E claim	Gold
Minnesota group	Gold
Mintern prospect	Tungsten
Miracle mine	Uranium
Miranda claim	Gold
Miranda mine	Tungsten
Mistake claim	Silver
Mizpah-Nevada mine	Silver
Mizpah-Tonopah	Silver
M J M group	Uranium
Mohawk	Gold
Mohawk-Buddy mine	Gold
Mojave Antimony mine	Antimony
Mojave Bonanza claim	Gold
Mojave Copper Co.	Gold
Mojave Corp.	Clay
Mojave Desert	Gypsum
Mojave Desert Gypsite Co.	Gypsum
Mojave Minerals Products Co. deposits	Roofing granule material
Mojave Mining & Milling Co. property	Gold
Mojave Rock Products Co. deposits	Roofing granule material
Mojo prospect	Uranium
Monarch	Gold
Monarch prospect	Gold
Monarch Rand group	Gold
Monarch Tungsten Gold Mining Co. mine	Tungsten
Monarch Tungsten Gold Mining Co. property	Gold
Monday	Copper
Mondora	Gold
Monitor group	Gold
Monolith Cement Co. property	Tungsten
Monolith clay deposit	Clay
Monolith Portland Cement Company Plant and deposits	Limestone, dolomite, and cement
Monte Cristo	Gold
Monte Cristo claim	Gold
Montezuma claim	Gold
Montezuma mine	Gold
Mooers claim	Gold
Moon claim	Gold
Mooncastle prospect	Gold
Moreland property	Tungsten
Moren Sophie group	Gold
Morning Glory	Gold
Morton prospect	Gold
Mountain group	Gold
Mountain Key claim	Gold
Mountain King prospect	Gold
Mountain Minerals dolomite deposit	Limestone, dolomite, and cement
Mountain Minerals dolomite deposit	Roof granule material
Mountain States Uranium Corp. Agricultural Gypsite Div.	Gypsum
Mountain Summit Lime Co. deposit	Limestone, dolomite, and cement

Name	Commodity
Mountain View claim	Gold
Mountain View prospect	Tungsten
Mount Breckenridge prospect	Gold
Mount Breckenridge prospect	Iron
Mt. Henderson group	Gold
Mudd mine	Borates
Muroc Clay Company	Clay
Muroc clay deposit	Clay
Muroc Silt deposit	Clay
Nadeau mine	Gold
Naja mine	Tungsten
Naja Scheelite mine	Tungsten
Nancy Hanks mine	Gold
Naomi prospect	Gold
Napoleon	Gold
Napoleon mine	Gold
N A W prospect	Gold
Neglected claim	Gold
Nellie Dent mine	Gold
Nellie K prospect	Gold
Nellie S and Maggy B	Gold
Nemitz prospect	Gold
Nephi prospect	Gold
Nevada Placer Mining Co. property	Gold
New claim	Silver
New Deal mine	Gold
New Deal prospect	Graphite
New Discovery	Gold
New Eldorado	Gold
New Joshua prospect	Pumice and pumicite
New Mex group	Gold
New York	Gold
Nichol Peak prospect	Tungsten
Night Owl	Gold
Nob Hill claims	Uranium
Nobhill prospect	Gold
Noble prospect	Gold
Nondescript	Silver
Norden Mine	Gold
Norman Placer	Gold
Northern View prospect	Gold
North Extension Sumner mine	Gold
North Star	Gold
North Star claim	Gold
North Sumner mine	Gold
No-See-Um prospect	Tungsten
Nugget Flat group	Gold
N. W. Sweetser mine	Quartz and feldspar
Nymph and Last Chance claims	Gold
Nyra prospect	Gold
Occidental mine	Gold
Occidental mine	Silver
Oil Canyon deposit	Limestone, dolomite, and cement
O K group	Gold
O K Placer	Gold
O K prospect	Manganese
Old Baldy prospect	Gold
Old Bodfish claim	Gold
Old Cowboy	Silver
Old Garlock	Gold
Old Grandma group	Gold
Old Keyes	Gold
Old Look Out	Gold
Old Mill No. 1	Antimony
Old Mojave	Gold
Olivette	Gold
Olympic group	Gold
Olympus mine	Gold

Name	Commodity
Oney Lease	Silver
O. Niell shaft	Tungsten
Onolite prospect	Tungsten
Opal Extension and South Opal group	Pumice and pumicite
Opal prospect	Gold
Operator Consolidated mine	Gold
Operator Divide mine	Gold
Operator mine	Gold
Ophir claim	Gold
Ophir-Zuck group	Tungsten
Opportunity prospect	Gold
Oracle prospect	Tungsten
Orange Blossom group	Copper
Ora No. 1 claim	Pumice and pumicite
Ore mine	Gold
Orinoco	Gold
Oro Fino	Gold
Oro Fino mine	Gold
Oro Fino placer	Gold
Orphan Anne prospect	Copper
Orphan Boy claim	Gold
Orphan Girl mine	Gold
Orrell group	Tungsten
Osses claim	Gold
Osso	Gold
Outlook claim	Gold
Oversight	Gold
Owen group	Uranium
Owl mine	Tungsten
Pacific Alkali Co.	Borates
Pacific Coast Borax Co. holdings	Borates
Pacific Gypsum Co.	Gypsum
Pacific Gypsum Corporation	Gypsum
Pacific Sewer Pipe Company	Clay
Packwood Canyon	Gypsum
Packwood Creek	Gypsum
Padre mine	Antimony
Pala Ranch deposit	Quartz and feldspar
Pala Ranch mine	Tungsten
Palmer	Gold
Pampa Gypsum Mining Co.	Gypsum
Pappy mine	Tungsten
Parrott and Allee claims	Pumice and pumicite
Pasadena	Gold
Pasadena mine	Gold
Patsy claims	Tungsten
Patterson	Gold
Pay Day prospect	Gold
Paymaster claim	Gold
Pay Roll	Gold
Pearl claim	Gold
Pearl Wedge mine	Gold
Penimore mine	Gold
Pennsylvania mine	Gold
Pescado Creek deposit	Limestone, dolomite, and cement
Pestle group	Gold
Pettit Ranch deposit	Uranium
Philadelphia Wedge claim	Gold
Phoenix Const. Co. pit	Sand and gravel
Phoenix mine	Gold
Pickwick mine	Gold
Pine Tree	Gold
Pine Tree mine	Gold
Pinmore mine	Gold
Pinon Hill prospect	Gold
Pioneer	Gold
Piute claim	Gold
Piute Consolidated	Gold
Placer Claims	Clay
Placer Gold Co. property	Gold
Plasse	Tungsten
Play Boy	Tungsten
Pleasant View mine	Gold
Pluto	Gold
Pluto and Socratic	Gold
Plymouth prospect	Gold
Poirier deposit	Limestone, dolomite, and cement
Polar Bear mine	Gold
Polka Dot	Gold
Pomona Mill and Mining Co. property	Gold
Populist	Gold
Porter group	Gold
Porter prospect	Gold
Portuguese	Gold
Poso mine	Gold
Pottery group	Pumice and pumicite
Power Line mine	Tungsten
President prospect	Gold
Pride of Mojave mine	Gold
Princeton	Gold
Prize prospect	Gold
Producer prospect	Gold
Prospector	Gold
Prosperity prospect	Tungsten
Punkie prospect	Gold
Purity Gypsum Mines	Gypsum
Putnam group	Gold
Pyarin group	Tungsten
Pyavin group	Tungsten
Pyramid	Gold
Quality Oil Co. property	Uranium
Quartz	Lead
Queen Esther mine	Gold
Queenie mine	Pumice and pumicite
Queen of Sheba	Gold
Queen of the Desert	Gold
Quien Sabe (?) prospect	Gold
Racket	Gold
Radcliffe mine	Tungsten
Rademacher	Wollastonite
Rademacher mine	Gold
Radiation prospect	Uranium
Rainbow prospect	Gold
Ramey	Tungsten
Ramey prospect	Sulfur
Rand	Gold
Rand claim	Gold
Rand Gold Dredging Assoc. property	Gold
Rand group	Gold
Rand group	Tungsten
Rand mine	Tungsten
Rand Placers	Gold
Randsburg Coal Co.	Coal and peat
Ratcliffe mine	Tungsten
Rattler	Gold
Rattlesnake	Gold
Rattlesnake group	Gold
Rawhide	Gold
Raymond mine	Tungsten
Rayo mine	Antimony
Red Bird mine	Gold
Red Cross	Gold
Red Hill deposit	Clay
Red Hill mine	Gold
Red Rose claim	Clay
Red Strike prospect	Gold

Name	Commodity
Red Wing mine	Gold
Reform prospect	Gold
Regent claim	Gold
Regina claim	Gold
Relief claim	Gold
Republic	Gold
Resurrection mine	Gold
Retreat mine	Gold
Revenue claim	Gold
Reward	Gypsum
Reward prospect	Gold
Rex claim	Gold
Reymert claim	Gold
Ricardo placer mines	Gold
Riches & Wealth	Gold
Riley Clay deposit	Clay
Rimrock mine	Tungsten
Rinaldi and Clark	Lead
Rinker Rock Co. pit	Sand and gravel
Rip Rap	Gold
Ritter Ranch	Barite
Riveredge placer	Gold
River Rock Co. pit	Sand and gravel
Rizz No. 2	Gold
Roberts Farms Gypsum Mines	Gypsum
Robinson	Lead
Rochefort mine	Gold
Rocket claim	Gold
Rock Pile prospect	Gold
Rocky Pt. claim	Gold
Roper	Gold
Rosamond clay deposit	Clay
Rosamond feldspar and silica mine	Quartz and feldspar
Rosamond feldspar mine	Quartz and feldspar
Rosamond kaolin deposit	Clay
Rosamond mine	Quartz and feldspar
Rosamond prospect	Uranium
Rosco prospect	Talc
Rose M. claim	Gold
Rose mine	Gold
Rotchfort mine	Gold
Rough & Ready	Gold
Round Mountain area	Gypsum
Royal	Gold
Royal Bohee mine	Tungsten
Royal Bohn mine	Tungsten
Ruby	Gold
Ruby mine	Gold
Run Around claims	Copper
Russell I	Borates
Russell II	Borates
Russian Bear vein	Gold
Rustler and San Diego claims	Gold
Ruth	Gold
Sailor Boy claim	Gold
Saltdale works	Salt
San Antonio mine	Gold
Sand Springs Canyon deposit	Limestone, dolomite, and cement
Sandstone	Gold
Sand Turtle claim	Gold
S and W prospect	Uranium
San Emidio deposit	Iron
San Emidio mine	Antimony
San Emigdio Canyon deposit	Limestone, dolomite, and cement
San Emigdio Canyon deposit	Stone
San Emigdio deposit	Asbestos
San Emigdio mine	Antimony
Santa Ana group	Gold
Santa Junta	Gold
Sarah Jane	Gold
Sargert prospect	Gold
Schmidt mine	Copper
Scorpion claim	Gold
Section 10 anomaly	Uranium
Sedan	Gold
Seeger deposit	Limestone, dolomite, and cement
Serpentine prospect	Talc
Setting Sun	Gold
Shafer and Whitney View	Gold
Shamrock	Copper
Shamrock No. 2 prospect	Manganese
Shasta claim	Gold
Sherman mine	Gold
Shipsey mine	Gold
Shoestring	Gold
Side Hill wedge	Gold
Side Issue	Gold
Side Winder	Gold
Sidewinder prospect	Gold
Sidney mine	Gold
Sidney Peak mine	Tungsten
Sierra Tungsten group	Tungsten
Sierra Vista prospect	Gold
Silverado prospect	Copper
Silver Bar Mining and Reduction Co. property	Gold
Silver Boy claim	Gold
Silver King	Gold
Silver Lady group	Uranium
Silver Prince prospect	Gold
Silver Queen mine	Gold
Silver Strand prospect	Tungsten
Silver Tip	Gold
Silverton prospect	Gold
Single Standard claim	Gold
Singleton claim	Gold
Sixteen to One	Gold
Skinner	Gold
Skukum	Gold
Sky Line mine	Gold
Slate Walls	Gold
Slosser shaft	Borates
Smith mine	Copper
Smith prospect	Gold
Smuggler prospect	Graphite
Snowball deposit	Limestone, dolomite, and cement
Snowbird mine	Gold
Snow White deposit	Clay
Snow White prospect	Tungsten
Snowy No. 1 prospect	Manganese
Soledad claim	Gold
Soledad Extension mine	Gold
Soledad Producers and Leard	Gold
Sonny Boy prospect	Tungsten
Sophie Moren mine	Gold
Southern Cross group	Gold
Southern Golden claim	Gold
South Fork deposit	Limestone, dolomite, and cement
South Rand prospect	Gold
Sovereign	Gold
Spa and Bonanza	Copper
Sparkplug; Sparkplug No. 2 claims	Gold

Name	Commodity
Ulexite shaft	Borates
Uncle Sam claim	Gold
Union	Gold
Union Lime Co. deposit	Limestone, dolomite, and cement
Union Paving Co. pit	Sand and gravel
Unip mine	Tungsten
Upper Butler prospect	Tin
Upper Sageland prospect	Gold
Up to Date	Gold
Urbana claim	Gold
U-See-Um group	Tungsten
Utopia claims	Uranium
Valley Agricultural Gypsum Co.	Gypsum
Valley claim	Gold
Valley View mine	Gold
Valverde	Gold
Vanuray claim	Clay
Vanuray prospect	Uranium
Venus	Gold
Veracity	Gold
Vera Queen group	Gold
Verdi Development Co. deposits	Uranium
Vestry prospect	Gold
Victor claim	Gold
Victoria mine	Gold
Victory claim	Gold
Victory No. 2 claim	Tungsten
Victory claims	Gold
Victory prospect	Tungsten
Victory Wedge mine	Gold
Vienna prospect	Silver
Viola	Gold
Virginia prospect	Gold
Voss Consolidated Placer mines	Gold
Voss properties	Copper
Vulcan claim	Gold
Vulture	Gold
Wade H. No. 2 claim	Gold
Wagman & McFarland mine	Gold
Walabu mine	Merecury
Walibu mine	Merecury
Walker	Gold
Walker's Pass	Magnesite
Wall Street	Copper
Wall Street group	Gold
Wall Street mine	Tungsten
Wall Street prospect	Gold
Walsh and McClaude group	Copper
Walsh group	Copper
Warrington mine	Gold
Wasp claim	Gold
Water	Gold
Waterhole prospect	Gold
Water Right	Gold
Watkins group	Gold
Wattal group	Tungsten
Wattenbarger prospect	Uranium
Wayne Case property	Uranium
Webb claim	Gold
Webb deposit	Clay
Webster Sand Co. pit	Sand and gravel
Wedge claim	Gold
Wegman mine	Gold

Name	Commodity
Wells Fargo	Gold
West Baker mine	Borates
West End field	Tungsten
West End mine	Gold
Western Gypsum Co.	Gypsum
Western Mine	Borates
Western Minerals prospect	Sulfur
Western Petroleum Co.	Gypsum
Western Prospect	Gold
Whipperwill	Gold
White Bluff clay claims	Clay
White Castle deposit	Pumice and pumicite
White Clay No. 1 and No. 2 claims	Clay
White Horse Rand prospect	Silver
White mine	Gold
White Pine	Gold
White Ridge deposit	Limestone, dolomite, and cement
White Rock mine	Clay
White Rose claim	Clay
White Star	Gold
White Star prospect	Gold
White Swan deposit	Clay
Whitmore mine	Gold
W. H. No. 1 mine	Gold
Why Not prospect	Tungsten
Wiggins mine	Antimony
Wildcat mine	Gold
Wildcat prospect	Tungsten
Wilhelmina	Gold
Wilkerson No. 1 prospect	Thorium and rare earths
Williams	Clay
Williams	Gold
Williams deposit	Pumice and pumicite
Williams Ranch deposit	Tungsten
Will Jean prospect	Gold
Willow placer	Gold
Windy mine	Gold
Windy Whiskers claims	Copper
Winnie mine	Gold
Wollastonite No. 1	Wollastonite
Wood No. 7 prospect	Tungsten
Wood-Owl mine	Tungsten
Yellow Aster	Gold
Yellow Bank	Gold
Yellow Boy mine	Gold
Yellow Dog mine	Gold
Yellow Dog Extension claim	Gold
Yellow Jacket	Gold
Yellow Rover mine	Gold
Yellow Treasure mine	Gold
You-Name-It deposit	Stone
Young America	Gold
Yucca Tree claim	Gold
Yukon	Gold
Yukon prospect	Gold
Zada mine	Silver
Zenda mine	Gold
Zig Zag	Gold
Zuna claims	Copper
Zundra claims	Copper

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